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E. A. SIMMONS, *President*
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Fuel Economy on the Northern Pacific

The intense interest which has been displayed in fuel economy during recent years has developed some unique and interesting methods of educating and training the enginemen, not only to make proper use of the fuel but to operate the locomotives more efficiently. The Union Pacific and the Illinois Central have used an instruction car which is equipped with a moving picture outfit. Even before this, however, the Northern Pacific had fitted up its car, which is described elsewhere in this issue, and sent it over the system with most excellent results. It is difficult to convey in any description of the methods used, the forcible and attractive way in which the underlying principles of combustion are presented to the engineers and firemen as they watch the experiments which are made in the first two lectures. The men seem to follow lectures closely, and the questions which they ask at the close would seem to indicate that the chemical experiments which are performed and the conclusions which are drawn from them are well within their comprehension. The engineer and fireman are, for the greater part of their time, beyond the limits of direct supervision. If rules and regulations for using the fuel and handling the locomotive are laid down for them, then "the now and why for" should be thoroughly explained in order that these things will appeal to their intelligence and that they may be thoroughly interested in putting them into effect. Thorough and painstaking instruction of these men, coupled with the inspiration that may be received from monthly meetings on each of the divisions and the fuel performance sheets which check up the individual performance and are issued shortly after the trips are made, will go a long way toward bringing about better results.

Contest on Yard Operation

There are so many important influences that contribute to the successful operation of a classification yard, that a thorough discussion of this subject should be exceedingly valuable. The design of the yard, the organization of the forces, the methods of enforcing discipline, the schedule of operations, the nature and distribution of the traffic throughout the day, and the number of separate classifications required, are only a few of the more prominent conditions. The "kinks" or "short cuts" which have proved so valuable in the mechanical and engineering departments, are also to be found here and are equally valuable. There is no more important subject before railway men today than the operation of our large yards, for it is here that the serious delays to cars occur, and therefore, where there is the greatest opportunity to increase the car mileage and thereby raise the standard of efficiency of railway operation. The contest on "The Operation of Large Classification Yards" has been inaugurated to bring out a free exchange of ideas and of practical suggestions gained through experience in this field of railway operation. We desire to secure a thorough and representative discussion of this subject, and to that end, we offer prizes of $50 and $35, respectively, for the two best papers received on this subject, while we will pay our regular space rates for all other papers accepted for publication. All contributions should be plainly marked, "Contest on Yard Operation," and should be sent to the editor of the *Railway Age Gazette*, 608 South Dearborn street, Chicago, to be received not later than June 1, 1914.

Legislation to Get Around the Courts

Reversing the decisions of the courts is a popular doctrine in many quarters, even with Mr. Roosevelt in South America; but it does not always work smoothly. Two striking instances have recently occurred. The legislature of New York, to please the commuters of Westchester county, passed a law to nullify the action of the courts in the suburban passenger fare case, the trial court having refused to sustain the action of the Public Service Commission in reducing season-ticket rates to a basis far below cost; but Governor Glynn has vetoed the bill. His action is noticed in another column. "Wholly unjustifiable" is the governor's characterization of an act of the legislature designed to forestall a decision by the highest court of the state (to which the fare controversy has been taken on appeal). The other instance is the New Jersey legislature's action in ordering the railroads to provide gates, flagmen or automatic bells at *every railroad crossing* on a certain class of highways. This new law has been approved by the governor. It does not apply, as has been reported, to every highway in the state, but only to those for which an appropriation has been made from the state treasury; but this means a heavy expenditure, and the vicious character of the law is shown in its sweeping terms, no provision being made for any consideration of the amount of wagon traffic or the frequency or the speeds of trains passing over any crossing. Bells, well constructed and properly maintained and cared for constitute a useful safeguard, in many situations; but if

they are to be provided at crossings of light traffic the railroad manager is likely to find himself forced to neglect other and more important safeguards, because of lack of money. It has been remarked that the New Jersey legislature passed this law because of the discovery that its former law, requiring all grade crossings to be abolished (at a cost of hundreds of millions) would probably fail of its purpose—the purpose to squeeze the railroads—because of its oppressive character. And, judging by past occurrences, the observation has a plausible sound.

THE FISCAL YEAR AND THE TRANSPORTATION DEPARTMENT

WHILE the effects of the fiscal year ending on June 30 are not felt so directly by the transportation department as by the maintenance of way department, its detrimental tendencies are, nevertheless, sufficiently evident in the transportation department to warrant the consideration of this subject from its standpoint.

The amount of business handled by the railways follows the same general tendencies of rise and fall between the different seasons from year to year. Beginning about July 15 teh traffic increases until it reaches a maximum about October 20, after which it gradually declines until it is at the minimum in the spring. At the very time when the traffic is increasing, and the number of trains is becoming the greatest, the average road is increasing its track forces, and placing more gangs out on the line and in the yards. Not only does the increase in the number of trains caused by the increase of traffic seriously handicap and delay the work of these maintenance forces, increasing thereby the cost of maintenance, but the work of the maintenance forces interferes to a serious extent with the safe and economical operation of trains. If the maximum forces could be employed on the track in the spring when the number of trains is at the minimum, the interference of the track and bridge forces with the movement of traffic during the period of heavy business would be largely eliminated, the result being that more trains could be run, and the overtime of train employees could be materially reduced.

It is, of course, during the season of heavy business that the car shortage is the most severe. The expenditures for the repair of equipment follow the same general tendencies of those for track work. As a result the repair of cars and locomotives is delayed during the spring to reduce expenses, and when the business increases in the fall, with the accompanying normal increase in the number of bad order cars and locomotives, the repair yards and shops are found to be already crowded, and the shortage of equipment and congestion of traffic are aggravated. During this rush of work small repairs are deferred or neglected, with the result that the number of derailments due to defects of equipment increases, and the claims for damages grow correspondingly.

Of equal importance with the tendency of the delay of track and equipment repairs to cause congestions of traffic, is the tendency of the relatively bad condition of track and equipment during the early summer to cause derailments. If sufficient forces were employed to bring the track and equipment into proper condition early in the spring, all of the beneficial results of good track and sound cars would be realized during the period of heavy traffic. While it is not desired to present any alarming statistics, it is a fact that the number of derailments due to defects of roadway and track, as well as of equipment, is increasing at a considerably faster rate than is the volume of traffic. Much of this increase is undoubtedly due to deferred maintenance. Manifestly, the number of derailments ought to be decreasing instead of increasing relatively to the volume of traffic handled.

These effects upon the operating department are all more or less intangible, and it is impossible to place any definite values upon them. But it will be acknowledged that they are produced, and that in the aggregate they cost the railways large sums of money annually. It is therefore reasonable to inquire why this condition is allowed to exist. If the fiscal year were so changed as to end on December 31, the tendency to reduce expenditures at the end of the year would be felt at the time when the traffic was declining and the congestion disappearing. The serious disadvantages resulting from a fiscal year ending on June 30 are clearly such as to demand a change at the earliest practicable time. The managements of the railways have the remedy in their own hands. They can apply it whenever they wish; for there can be no doubt that the Interstate Commerce Commission would readily concur in the change. The American Railway Association will meet in New York in May. Will it not do something positive and constructive at that meeting that will be a move in the right direction?

CARELESSNESS AS A CAUSE OF GRADE CROSSING ACCIDENTS

IT is well known that a large number of people are killed in accidents at railway grade crossings in the United States every year. The total number thus killed in the year ended June 30, 1913, was 1,125, of whom three were railway employees not on duty, 145 were trespassers and 977 were other persons not trespassing. Doubtless on a perfect railway there would not be any grade crossings. Unfortunately, neither the railways of the United States nor those of other countries are perfect, and as long as there are grade crossings, and either railway employees or the persons using the highways which cross the railways are careless, there will continue to be persons killed and injured at highway crossings.

The impression of railway officers has been that while railway employees often are not as careful at grade crossings as they should be, most of the accidents occurring at such places are due to the careless or reckless conduct of persons using the highways. That persons using the highways to cross railway tracks are extremely and culpably careless is strikingly indicated by some observations which J. M. Davis, general manager of the Baltimore & Ohio Southwestern and of the Cincinnati, Hamilton & Dayton, recently had made at various points on these lines. The following table gives in detail the results of the observations made on the Baltimore & Ohio Southwestern:

Statement Showing Conduct of Drivers of Motor Vehicles and Teams and Pedestrians in Crossing Tracks of Baltimore & Ohio Southwestern
(Observations made at intervals at various points)

Place of observation	Number of tracks at crossing	Average number of train movements over crossing per hour	Number of vehicles and pedestrians observed			Motor vehicles					Teams. Drivers looked			Pedestrians looked		
							Drivers kept moving and looked									
			Motor vehicles	Teams	Pedestrians	Stopped and looked in both directions	In both direct'ns	One way only	Straight ahead	Ran at high rate of speed	In both direct'ns	One way only	Straight ahead	In both direct'ns	One way only	Straight ahead
Cincinnati, Ohio (Harrison avenue)	4	7	25	1,044	1,724	...	1	2	22	...	14	32	998	22	112	1,590
Cincinnati, Ohio (Queen City avenue)	4	11	71	323	1,530	...	2	4	65	18	6	21	296	117	229	1,184
East Norwood, Ohio (Forest avenue)	3	5	43	274	3,107	...	8	10	25	39	33	104	137	196	311	2,600
North Vernon, Ind. (Fifth street)	3	4	20	211	3,176	...	11	3	6	5	123	51	37	806	1,145	1,225
Seymour, Ind. (Chestnut street)	2	2	124	638	4,333	...	14	28	82	...	52	108	478	114	293	3,926
Vincennes, Ind. (Second street)	4	4	135	197	1,458	115	8	...	12	1	62	2	133	257	36	1,165
East Springfield, Ill. (Second street)	4	12	245	271	1,594	...	29	36	180	20	42	55	174	298	301	995
East St. Louis, Ill. (Exchange avenue)	3	3	141	601	1,678	...	36	59	46	7	195	298	108	387	1,043	248
East St. Louis, Ill. (St. Clair avenue)	3	3	460	1,583	4,580	180	56	145	79	11	420	830	333	1,095	2,730	755
Total	..	..	1,264	5,142	23,180	295	165	287	517	101	947	1,501	2,694	3,292	6,200	13,688
Average per hour	..	6	9	39	174	2	1	2	4	1	7	12	20	25	46	103

SUMMARY

Motor vehicles	1,264
Teams	5,142
Pedestrians	23,180
Total	29,586

	Number	Average per hour	Per cent.
Stopped and looked in both directions	295	2	.9
Kept moving and looked in both directions	4,404	33	14.9
Kept moving and looked in one way only	7,988	60	26.9
Kept moving and looked straight ahead	16,899	127	57.3

It will be seen that the total number of observations made on the Baltimore & Ohio Southwestern was 29,586, and that only nine-tenths of 1 per cent. of the persons observed when using the highways took the precaution to stop and look in both directions before crossing the tracks, while less than 15 per cent. looked in both directions while keeping moving. Over 57 per cent. of all those observed looked straight ahead and kept on going.

The number of observations made on the Cincinnati, Hamilton & Dayton was much smaller, but otherwise the statistics for this road are similar to those for the Baltimore & Ohio Southwestern. The following table shows the results of the observations on the Cincinnati, Hamilton & Dayton:

STATEMENT SHOWING CONDUCT OF DRIVERS OF MOTOR VEHICLES AND TEAMS AND PEDESTRIANS IN CROSSING TRACKS OF CINCINNATI, HAMILTON & DAYTON
(Observations made at intervals at various points)

Place of observation	Number of tracks at crossing	Average number of train movements over crossing per hour	Number of vehicles and pedestrians observed			Motor vehicles					Teams. Drivers looked			Pedestrians looked		
							Drivers kept moving and looked									
			Motor vehicles	Teams	Pedestrians	Stopped and looked in both directions	In both directions	One way only	Straight ahead	Ran at high rate of speed	In both directions	One way only	Straight ahead	In both directions	One way only	Straight ahead
Cincinnati, Ohio (Hamilton avenue)	3	4	45	102	649	...	4	15	26	5	27	51	24	41	251	357
Hamilton Ohio (High street)	3	3	34	117	494	...	4	15	15	2	39	55	23	24	212	258
Dayton, Ohio (Leo street)	4	35	15	18	141	2	2	1	10	5	3	2	13	26	10	105
Rushville, Ind. (Main street)	1	1	24	67	282	1	3	5	15	...	32	14	21	38	84	160
Tuscola, Ill. (Main street)	1	1	2	68	207	...	...	...	2	...	4	...	64	...	...	207
Celina, Ohio	1	1	11	56	161	...	3	5	3	3	10	20	26	16	38	107
Total	..	..	131	428	1,934	3	16	41	71	15	115	142	171	145	595	1,194
Average per hour	..	8	11	36	161	...	1	4	6	1	10	12	14	12	49	100

SUMMARY

Motor vehicles	131
Teams	428
Pedestrians	1,934
Total	2,493

	Number	Average per hour	Per cent.
Stopped and looked in both directions	3	...	.1
Kept moving and looked in both directions	276	23	11.1
Kept moving and looked in one way only	778	65	31.2
Kept moving and looked straight ahead	1,436	120	57.6

The number of observations on the Cincinnati, Hamilton & Dayton was 2,493. Of those observed only one-tenth of one per cent. stopped and looked in both directions, and only 11 per cent. looked in both directions while keeping moving, while 57.6 per cent. looked straight ahead and kept right on going.

Comment on the results of these observations is almost superfluous. Undoubtedly the conditions which they disclose are typical of conditions prevailing all over the country. Manifestly, it is the place of those crossing railways to take precautions to avoid being struck. Both commercial and physical conditions render it impracticable for a railway train to be halted at every highway crossing to make sure that no team, automobile or pedestrian is going to get in the way. On the other hand, it is perfectly feasible for pedestrians and drivers of teams and automobiles to stop at highway crossings and make sure that no train is approaching.

In the long run, all grade crossings will have either to be eliminated or to be protected by gates and watchmen. At present there are many unguarded grade crossings. The cost of so protecting them all as to make them fool-proof would be very great. Furthermore, Americans are so chronically careless that even where there are crossing gates and watchmen, people constantly risk their lives by crawling under and around the gates unless policed better than they usually are in this country. The best remedy under the present conditions for grade crossing accidents would be a reduction in carelessness on the part of drivers of teams and automobiles and of pedestrians. But there does not appear to be much ground for optimism over the prospect of the effective application of this remedy.

NEW BOOKS

The Engineering Index Annual for 1913. Compiled from the Engineering Index published monthly in the Engineering Magazine. 508 pages, 6½ in. by 9 in. Bound in cloth. Published by the Engineering Magazine Company, 140 Nassau street. New York. Price, $2.00.

This volume of the Engineering Index is the twelfth since the work was first undertaken and the eighth since it assumed the annual form. The classified system of arranging the items is followed. As a result of special efforts, the book has been placed on the market this year considerably earlier than usual. The list of publications and transactions reviewed has been carefully scrutinized and the standard materially raised during the past 12 months. These now include the proceedings of such institutions as the Institution of Mining Engineers and the Faraday Society. Careful study has been given to the classification, to the assignment of articles to the different divisions of the classification to which they seem most logically to relate and to cross references under all other headings where anyone using the index might first search. This book is of very great value to anyone concerned in engineering work of any nature.

Applied Mechanics. By C. E. Fuller and W. A. Johnston, professors of Theoretical and Applied Mechanics, Massachusetts Institute of Technology, Boston, Mass. 380 pages, 6 in. by 9 in. Bound in cloth. Illustrated. Published by John Wiley & Sons, Inc., New York. Price $2.50.

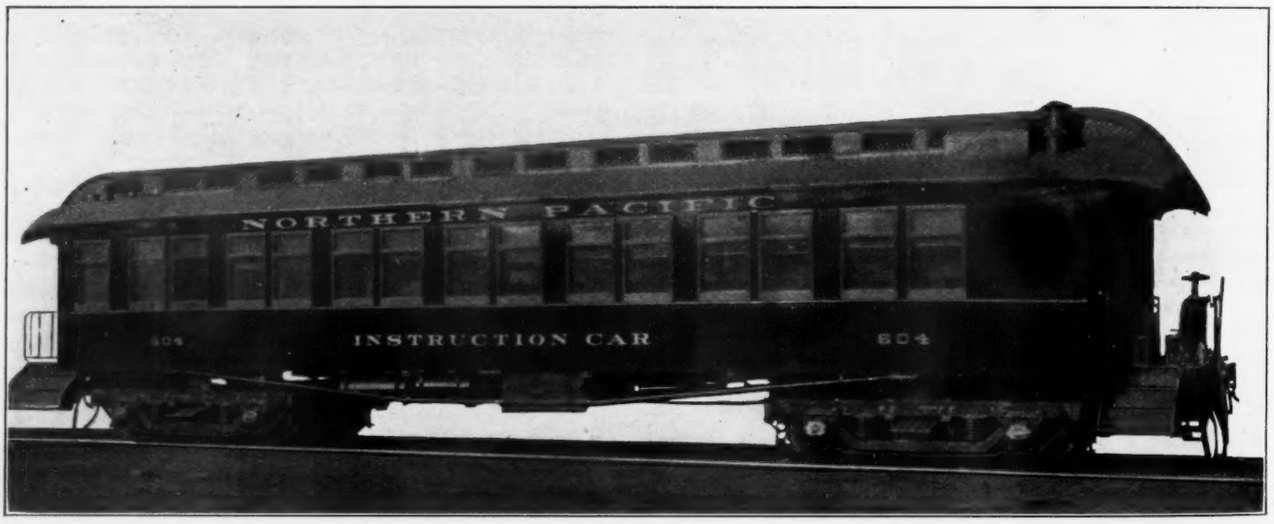
This is the first volume of a series of books on applied mechanics that are to be written by the authors. It is written primarily for students who have had a preliminary training in the principles of mechanics, such as is given in a course of physics, and in the elements of mechanism. Volume I deals with statics and kinetics. It contains five chapters; the first is a general introduction; the second, on statics, includes a thorough discussion of forces; the third, on center of gravity, discusses both plane surfaces and solids; the fourth, on moment of inertia, is handled in a similar manner, and the fifth, on kinetics, including kinematics, work, power and energy, friction, kinetics of rigid bodies having plane motion only, and impact. This book is probably the most complete work written on these subjects, as the authors have had many years of successful experience in teaching applied mechanics, and fully appreciate what a student of this subject requires. It is evident from the way in which the book is written that the authors have taken advantage of their teaching experience, and as a result have presented a book that may be readily digested by the student. Efforts have been made to keep away from complicated expressions with a view to simplicity, and where it has been thought necessary, illustrative examples have been added to make the work more readily understood.

Fuel Instruction Car on the Northern Pacific

Now Making Its Second Trip Over the System; It Has Proved a Most Important Factor in Fuel Economy

For the past three years the Northern Pacific has been giving special attention to fuel economy, with the result that the cost of fuel per gross ton mile has been very greatly reduced. This reduction has been due to several causes, including the introduction of powerful locomotives, designed especially to suit the fuel used; the application of superheaters to new engines, including switchers, and to the older passenger and freight engines of heavier types; the use of improved ash pans; the exercise of more care in the purchase and distribution of fuel; and the change from one, two and sometimes three small air pumps on one engine, to one large air pump on the heavy freight power, and to other like improvements.

Probably, however, the greatest factor that has contributed to the reduction in fuel costs, has been the use of a fuel instruction car, which has made one trip over the entire system, extending over a period of sixteen months, and is now well started on its second trip. There are two fuel supervisors; each one is in charge of the car when it is used in his territory. Division officers, locomotive engineers, firemen, hostlers and shop engineers and firemen are required to attend the course of three lectures and instructions that are given in the car.



Fuel Instruction Car Which is Now Making its Second Trip Over the Northern Pacific

The first lecture is largely in the nature of a demonstration which covers in a simple but impressive way the various chemical reactions which take place in the firebox. In the second lecture a sample of coal is placed in a retort and the volatile matter is driven off, with which various experiments are made to demonstrate certain of the fundamental principles of combustion. The third lecture is accompanied by a series of stereopticon views in which the principles developed in the first two lectures are applied to the proper and improper firing and handling of the locomotive. So unique are the methods employed in these three lectures, and so effective have they proved in inspiring the enginemen and firemen to better efforts, that a more or less complete abstract of them is given below.

FIRST LECTURE.

In opening the first lecture attention was directed to the fact that fuel is one of the largest items in the operating expenses of the road, and reference was made to the first five cards posted on one side of the car which read as follows:

"The Northern Pacific Railway used 2,601,184 tons of coal in 1913, costing $7,280,714.02."

"The Northern Pacific Railway made 31,221,372 locomotive miles in 1913."

"One shovelful (15 lb.) of coal saved per locomotive mile would have amounted to 234,160 tons."

"The coal so saved would have filled 117 trains of 40 cars each, with 50 tons to the car, costing $655,000."

"A saving of one shovelful per ton in coal used last year would have meant a saving to the company of $54,605."

The fact was emphasized that in order to secure the best results the enginemen must understand the theory which underlies the combustion of coal in the firebox, and that they must combine this theory with practice. The questions were put to the class as to what fire and burning were, the answers being that "burning is the rapid chemical combination of oxygen with fuel" and "the heat and light produced by burning is what we call fire."

The lecturer explained that matter was divided into two classes, elements and compounds, and described the nature of each. To make a more forcible impression on the minds of the men, the blackboard back of the laboratory table was made use of, as shown in one of the illustrations. An element was defined as matter in its simplest possible form. Compounds were defined as substances which could be subdivided into elements. The iron of which the tongs used in the demonstration was made was given as an example of an element, and a piece of wood which was partly burned, forming a gas and carbon, was given as an illustration of a compound. Air was described as a mechanical mixture which was made up in the proportion of one-fifth oxygen and four-fifths nitrogen (by volume). The apparatus used in the first lecture and the arrangement of the laboratory table is shown in one of the illustrations.

A series of experiments was then performed to show that chemical changes were brought about by two general processes. Where two or more elements are brought together and combined, forming a compound, there is a building-up process which produces heat. Where a compound is treated chemically and separated into its elements, there is a tearing down process which absorbs heat. In burning the coal in the firebox it is necessary first to split the compound (coal) into its elements, thus producing a tearing down process which absorbs some of the heat from the fire. This is followed by a building up process

in which the oxygen of the air combines with the fuel elements of the coal and burns, producing heat.

As an illustration of the tearing down process, a small quantity of red oxide of mercury was placed in a test tube. Upon the application of heat from a bunsen burner the oxygen or gas was driven off, leaving globules of mercury deposited on the inside of the tube. The presence of oxygen as it was driven off was demonstrated by taking a match with a small ember on its end and placing it in the end of the test tube. As soon as the oxygen came in contact with it, it started to glow brightly.

In demonstrating the building up process, a piece of magnesium ribbon was ignited and as it burned, giving off heat, a compound (magnesia) was formed in the shape of a powder, caused by the combination of the magnesium with oxygen. Another interesting experiment illustrating the production of heat was made by placing a small amount of sugar in a glass jar to which was added a small amount of sulphuric acid. There was an immediate change in the color and the bulk of the material in the glass, and a very noticeable amount of heat was produced.

A series of experiments was then performed in the making

Some of the "Pointers" Posted in the Fuel Instruction Car

Laboratory Table of Fuel Instruction Car as Arranged for the First Lecture

and using of oxygen. A small quantity of black oxide of manganese was mixed with some potassium chlorate and placed in a test tube. The statement was made that oxygen was transparent, colorless, odorless, tasteless and slightly heavier than air. The open end of the test tube was connected by a rubber tube to the mouth of a bottle, which had been filled with water and inverted in a large glass jar, also filled with water. Heat was applied and the oxygen which was driven off was collected in the small jar, the water in which was driven out by the gas as it entered. When it was filled a cork was placed in its mouth, and it was removed and another jar was collected one-third full of oxygen. The cork was removed from the jar which was filled with oxygen, but due to the fact that oxygen is heavier than air, it, of course, would not escape from the jar.

Experiments were made to demonstrate that oxygen is necessary for burning and that carbon will burn. A stick of wood with an ember on its end was inserted in the jar and immediately began to glow brightly. As the oxygen combined with the carbon of the wood and formed carbon dioxide it became necessary to insert the stick deeper and deeper into the jar in order to have the process continue, until finally the ember died out, indicating that the supply of oxygen was exhausted. This exhaustion was first evidenced by the formation of smoke, indicating that there was not a sufficient amount of oxygen remaining to provide for complete combustion. To prove that oxygen must be present to furnish combustion, the empty bottle was placed over the top of the bunsen burner flame, which immediately went out because of the lack of sufficient oxygen to maintain combustion.

Granulated zinc was then placed in the bottom of a glass container, through the cork of which extended a short glass tube and also a filling tube, the latter extending to the bottom of the vessel. Hydrochloric acid was poured into the bottle through the filling tube, generating hydrogen, which was driven off through the short glass tube. It was explained that hydrogen is also a transparent, colorless, odorless, tasteless gas which has a great chemical affinity for oxygen, is the lightest gas known and burns with the hottest flame.

Hydrogen was then collected in a bottle in the same way as oxygen was collected in the previous experiments, and tests were made to prove that oxygen must touch the fuel in order that the latter may burn. A large bottle full of hydrogen, held inverted, was ignited but burned only at the mouth of the bottle where it came in contact with the oxygen of the air; a lighted match was next introduced into the bottle so that it was entirely surrounded by hydrogen. The flame was immediately extinguished, thus proving that without contact with oxygen, burning cannot take place. As the match was withdrawn it would again ignite as it came in contact with the burning at the mouth of bottle where the oxygen of the air united with the hydrogen. As the bottle was turned over, air on account of being heavier than hydrogen flowed into the bottle, supplying oxygen and causing the flame to extend therein.

The bottle which had been filled one-third full of oxygen then had the remaining two-thirds filled with hydrogen. A cork was placed in the mouth of the bottle and it was thoroughly shaken. When the cork was removed and a burning match applied at the mouth of the bottle, a loud report, resulting from the instantaneous combination of the hydrogen and oxygen, thoroughly impressed all present of the perfect combustion taking place, to obtain which in locomotive practice there must be a thorough mixture of oxygen with the fuel elements in the firebox.

The formation of water by the burning of hydrogen was demonstrated by lighting the hydrogen issuing from the end of a glass tube connected with the vessel in which the hydrogen was being generated. Small beads of moisture were deposited on the sides of a bottle held directly over the flame. The statement was then made and then reproduced on the blackboard to the effect that soft coal was composed of coke, made up in turn of fixed carbon and ash; of hydro-carbons which are made up of free carbon and hydrogen; and of iron pyrites, made up of iron and sulphur. The chemical symbols were given for each of these materials and were shown on the blackboard.

The application was then made of the foregoing experiments to the work which takes place in a firebox, and the eight last lines placed on the blackboard (those items below the X mark shown in one of the illustrations) were said to show exactly what happened to a shovelful of coal when it was placed in the firebox. First it absorbs some of the heat, which tends to tear down or separate the coal into its component parts. The moisture is driven off in the form of steam at 212 deg. F. and the hydro-carbon gases begin to come off at about 350 deg. and continue until the coal reaches a temperature of about 900 deg., when all off the gases will have been driven off.

It is necessary to apply a temperature of 1,800 deg. to tear down the hydro-carbon gases or separate them so that they can be burned, and this is the minimum temperature which should be maintained in the firebox. The best efficiency, however, is obtained at temperatures of 2,000 deg. F., or more. The free carbon of the hydro-carbon gases, when it has sufficient heat and oxygen burns perfectly, forms a compound colorless gas known as carbon dioxide, which is made up of two parts of oxygen and one part of carbon. The hydrogen as it burns combines with the oxygen and forms a colorless gas—steam. The fixed carbon of the coke combines in the same way that free carbon does and forms carbon dioxide. The iron burns and forms an oxide of iron made up of two parts of iron and three of oxygen, and the sulphur forms a colorless gas (sulphur dioxide) made up of one part of sulphur and two of oxygen. It, therefore, is necessary to have a plentiful supply of air, in order that perfect combustion of the fuel elements may be obtained, and the firemen must use good judgment so as not to place too much coal on the grates, nor allow the fire to become "dirty" and thus prevent the entrance of air through the fuel bed. If the carbon does not have a sufficient amount of oxygen to form carbon dioxide each part of the carbon will take up one part of oxygen, forming carbon monoxide. This results in a very great loss, as the carbon dioxide when it burns gives off 14,500 British thermal units, while the carbon monoxide gives off only 4,500, a loss of 10,000 B. t. u.

To convey to the enginemen some idea of what a British thermal unit means, an ordinary match was burned and the statement was made that the heat produced was approximately equivalent to one B. t. u. As the carbon monoxide is also a colorless gas, the absence of smoke from the stack does not necessarily mean that there is perfect combustion in the firebox. There is, on the other hand, a possibility of getting too much free air into the firebox because the nitrogen in the air passes off through the tubes and smokestack without undergoing any chemical change and absorbs large quantities of heat on the way, the greater part of which goes out of the stack and is entirely lost. As there are four parts of nitrogen in the air to each one of oxygen, the excessive amount of nitrogen, after a sufficient amount of oxygen has been furnished to provide perfect combustion, will cool the firebox, resulting in the formation of carbon monoxide instead of carbon dioxide.

SECOND LECTURE

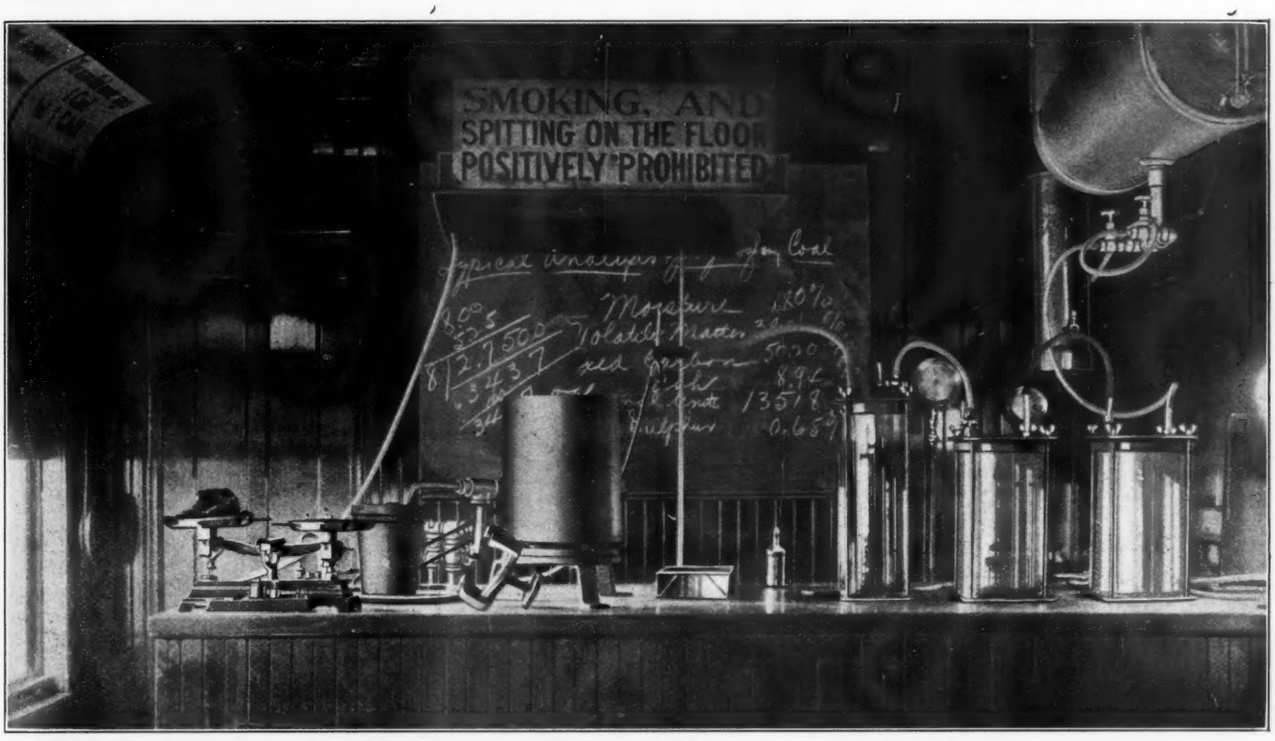
In opening the second lecture the fuel supervisor asked one of the firemen present to step over to the coal tipple and gather about a half pound sample of average coal from the pile. The particular coal used at this station was from the Pittsburgh district and tests which had been made in the laboratory at St. Paul showed the following analysis:

Moisture	1.80 per cent.
Volatile matter	39.06 per cent.
Fixed carbon	50.20 per cent.
Ash	8.94 per cent.
Sulphur	0.65 per cent.
British thermal units	13,518 per lb.

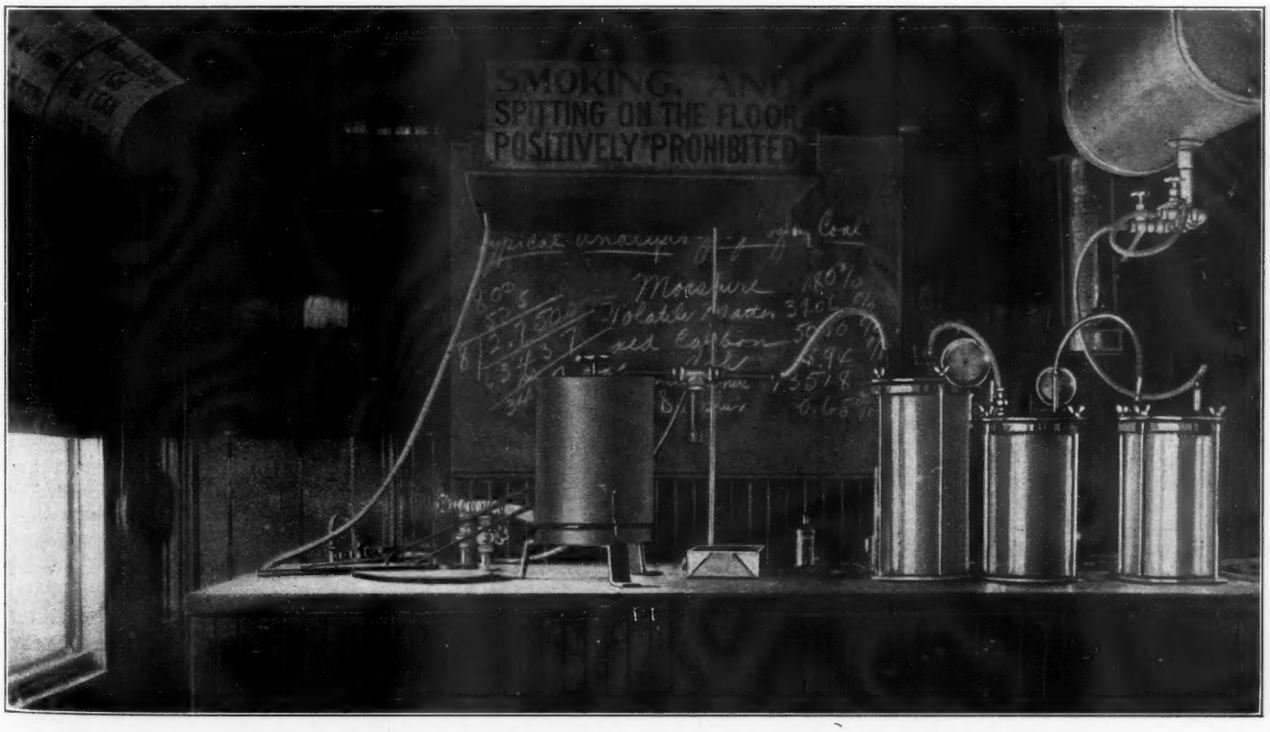
The purpose of the following demonstration was to illustrate the chemical changes which take place in the firebox. Eight ounces of coal was weighed out on the small scale, which is

shown in the illustration, and was then placed in a retort, the cover of which was clamped on, after which the retort was placed over the blow stove, and the hood was lowered so that the heat and gas from the fire might be carried up and out of the car. Extending from the cover of the retort was an iron pipe, which is quite clearly shown in the illustrations. As the retort became heated to a temperature of 212 deg. the moisture was driven from the coal and passed out through this iron tube. As the temperature raised, the hydro-carbon gases began to be expelled. These gases when thoroughly washed of tar are colorless; in this case the tar which was mixed with them gave them a brownish color.

When it became evident that the hydro-carbon gases were being forced out through the tube it was connected by rubber tubing to the first and tallest of the three jars shown in the illustrations. All three of these jars were filled with water and



Arrangement of Apparatus at the Opening of the Second Lecture



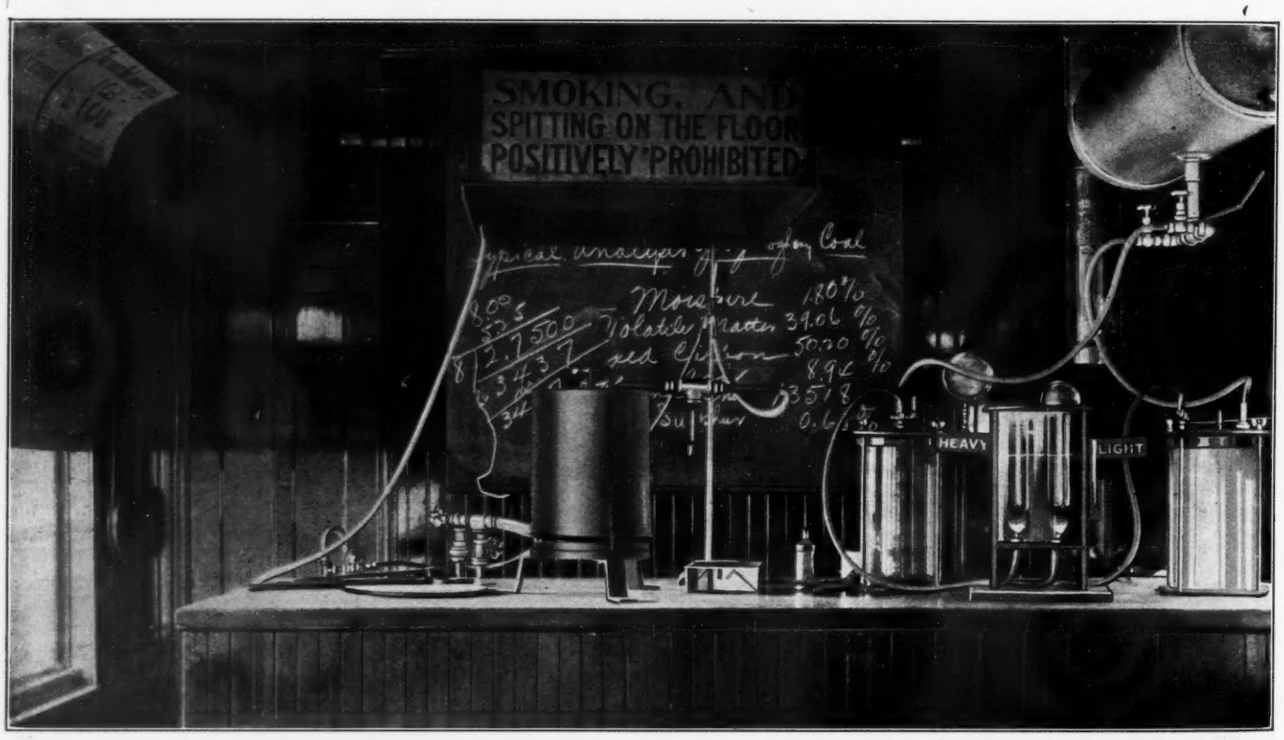
The Hydro-Carbon Gases Driven Off from the Retort are Being Gathered in the Glass Jars

the one farthest to the right was connected by a tube to the overhead tank. The column of water from the tank, which was 52 in. high, gave a pressure of about 2 lb. per square inch in the glass jars. The hydro-carbon gases were conducted to the bottom of the first jar through a glass tube, and as they were discharged, passed up through the water. The effect was to wash them and to precipitate the tar. That a small amount of this still remained in the gases was evidenced by the fact that they were of a light yellowish color when they reached the top of the jar. As the pressure of the gas increased it was forced over into the second jar through a rubber tube, and the water which was displaced when the gas entered the top of this jar was driven from the bottom through a glass tube and over into the third jar. The water which was thus displaced in the third jar was forced back up into the tank against the pressure of 2 lb. When both of the jars had become filled with hydro-carbon gases the valve was closed leading to the water tank and the rubber tube was disconnected between the retort and the glass jar, the valves at the connections to the glass jars first being closed so that the gases could not escape to the air.

The gases escaping from the tube leading from the retort were then connected by means of a rubber tube to a "Y" burner under the hood and ignited. Some idea of the great quantity of gas which is driven off was conveyed by the fact that this flame burned continuously during most of the rest of the lecture, which lasted possibly half an hour or more longer. As it escaped into the air the outer part of the stream of gas, which came in contact with the air, was ignited and burned with a yellowish flame. Inside of this flame, however, could be seen a bluish cone of unburned gas, a very considerable portion of which did not have an opportunity of coming into contact with the oxygen of the air and escaped through the hood in the form of smoke. To prove that this gas would burn if the oxygen could come in contact with it, the end of a glass tube, the two ends of which were bent at right angles with the main part of tube, one end extending downward and the other upward, was placed in the center of the flame and the gas which entered the tube and passed through it was ignited as it passed out of the other end and burned in the same way as the first flame.

The glass tube was then removed, and by pressing on the rubber tubing through which the hydro-carbon gases escaping from the retort flowed, it was possible to adjust or throttle the amount of the gas so that practically all of it could come in contact with the oxygen of the air, thus producing practically perfect combustion. The same result was brought about in another way. Air under pressure was introduced into the tube which conveyed the hydro-carbon gases from the retort to the air; the supply of this air, which was controlled by a valve, being adjusted so that exactly the right amount was introduced to mix properly with the gases and produce perfect combustion. This was evidenced by the disappearance of the smoke and the bluish cone, while the flame changed from yellow to a white heat. This experiment emphasized the necessity of care on the firemen's part not to add coal to the fire too fast and to use care in distributing it.

When the gases in both of the jars had been reduced to atmospheric pressure each jar was connected by a rubber tube to a small burner carried in a wooden framework, as shown in the illustration. One of the burners had an opening 1/32-in. in diameter and the other an opening 1/64-in. in diameter. A test tube containing exactly one ounce of water was placed directly over each of the two burners. The valves in the pipes leading from the water tank to the glass jars were opened, admitting water to the jars and driving out the hydro-carbon gases through the two burners underneath the test tubes. The escaping gas was ignited in both cases and, of course, escaped much faster through the burner with the larger opening. This corresponded to heavy firing and the burner with the smaller opening corresponded to light firing. Two signs, one marked "heavy" and the other "light," were accordingly fastened to the framework which held the burners and tubes in place. The water in the tube above the burner with the large opening started to boil first. As the instructor announced, this is analogous to heavy firing where the pops are open at the beginning of the trip but where the fireman is "up against it" for steam at the end of the trip. The flame of the small burner continued to burn much longer than the one with the larger burner, and more of the water in the tube was evaporated with the small burner than with the larger one. The



Light and Heavy Firing Illustrated by the Burning of Hydro-Carbon Gases

demonstration emphasized the advantages of light and steady firing as compared to heavy firing.

Near the close of the lecture and about one hour from the time the coal was placed in the retort the hydro-carbon gases were practically entirely driven off, as indicated by the gradual decrease in the size of the flame. The retort, which was red hot, was opened and the residue or coke was lifted out. It weighed 5¼ oz., showing that 2¾ oz. had been driven off in the shape of moisture and gases. In other words, these two amounted to 34.37 per cent. of the coal, or somewhat less than the analysis of the coal which was made by the laboratory showed. This is doubtless because the gases were not entirely driven off, and there might, of course, be some variation in the grade of the coal tested.

In closing the lecture attention was directed to the fact that the presence of black smoke indicated waste of coal, and that while it is sometimes necessary to make this black smoke, the fireman must make sure he is not at fault. Some figures were then given from a report on the "Utilization of Fuel in Locomotive Practice" by Dr. W. F. M. Goss, which was published in Bulletin 402 of the United States Geological Survey. This showed that in 1906 there were 51,000 locomotives in the United States and that these locomotives used 90,000,000 tons of fuel at a cost to the railways of $170,500,000. The following summary of results obtained from fuel in locomotives was then quoted:

		Tons
1.	Consumed in starting fires, in moving the locomotive to its train, in backing trains into or out of sidings, in making good safety valve and leakage losses, and in keeping the locomotive hot while standing (estimated)	18,000,000
2.	Utilized, that is, represented by heat transmitted to water to be vaporized	41,040,000
3.	Required to evaporate moisture contained by coal	3,600,000
4.	Lost through incomplete combustion of gases	720,000
5.	Lost through heat of gases discharged from stack	10,080,000
6.	Lost through cinders and sparks	8,640,000
7.	Lost through unconsumed fuel in the ash	2,880,000
8.	Lost through radiation, leakage of steam and water, etc	5,040,000
		90,000,000

Attention was directed to the fact that proper firing is much less laborious than improper firing, and the firemen were asked to experiment and see if the recommended methods would not give better results. Absence of black smoke does not always indicate that the best results are being obtained in the firebox. For instance, if air is admitted to the firebox through holes in the fire bed, the hydro-carbon gases, which are colorless, do not rise to a high enough temperature to be ignited, and pass out through the stack unburned. Light and frequent firing gives the best results always.

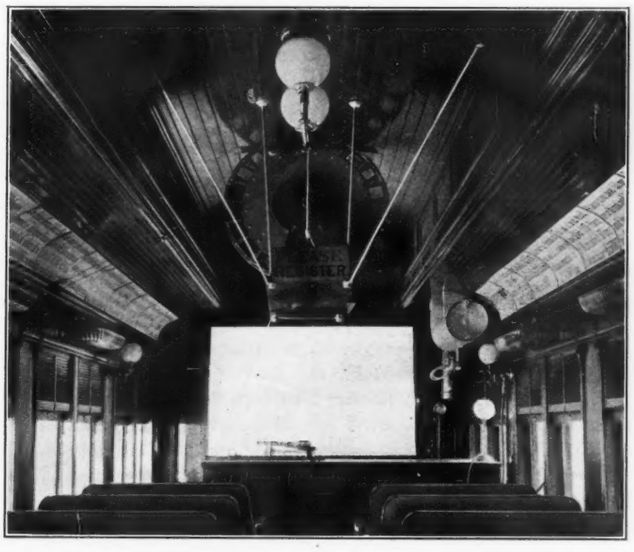
THIRD LECTURE

For the third lecture a white curtain was drawn down over the blackboard, the shades were drawn at the windows, and a stereopticon lecture was given. The stereopticon is hung from the ceiling and uses acetylene light. The slides are mounted near the outer edge of a large metal disk, as shown in the photograph, and this can be revolved at will by means of an endless cord passing over a wooden pulley attached to the disk and extending alongside the car to another pulley near the lecturer's desk. The lecturer, therefore, without leaving his position, can change the pictures at will.

The third lecture goes into the problem of carrying a proper fire and the use of draft appliances. The Northern Pacific advertises the wonderful scenery along its lines, and the first picture which was thrown on the screen showed the North Coast Limited going through a beautiful valley, but with a large amount of black smoke coming from the stack, which really placed a blanket on the scenery in the vicinity. Of what use are the scenic advantages if the fireman in failing to do his duty shuts them off from the view of the passengers? The second picture showed the same train with no smoke, the fireman practicing light and frequent firing. This is as it should be.

Another picture showed a tender properly coaled and trimmed. While the fireman is not personally responsible for this he can do much to help toward having the work properly done. Wings have been applied to stop the coal from rolling out the gangway, and deflector plates have been placed over the holes in the deck through which the shaker lever passes. The enginemen should see that these are properly maintained. Attention was also called to the fact that the coal should not be wet down too much since heat will have to be wasted in driving the moisture off after the coal reaches the firebox. Only enough water should be applied to prevent the fine coal from wasting through the flues and from blowing off the tender.

A series of several views was then shown illustrating the arrangement of the draft appliances in the front end and describing the function of each of the parts. Views were also shown of the Schmidt superheater, and the advantages of superheated steam were discussed in a simple but thorough manner. Then followed a series of slides showing sections through the firebox under various conditions of proper and improper firing. For instance, one view showed what was designated as a "muskrat house" formed by the coal hitting the brick arch and piling up underneath. Another view showed the coal piled at the back end. These things cut down the grate area and seriously affect the capacity of the locomotive, inasmuch as every square inch of grate area is needed when working to capacity. Another view showed the coal piled up at the center of the firebox and with



Fuel Instruction Car Showing Rear End of Stereopticon Hung from the Ceiling

very little of it at the edges along the side, back and front sheets. This allows the air to enter at these points and chills the sheets, which is bad practice, whether viewed from the standpoint of economy in the handling of fuel or of the upkeep and maintenance of the firebox. Two other views showed how a fire should be maintained to give the best results, the coal being built up slightly at the side, front and back sheets.

Another set of the pictures were of more than ordinary interest because they showed the chemical formulas of the gases which were being driven off from the fire. One of the pictures showed the firebox at a temperature of 2,500 deg. There was no free carbon or smoke and no CO, or carbon monoxide. The gases were all in the form of CO_2, or carbon dioxide, and H_2O, or steam. Another one of the colored views with the chemical formulas showed a clinkered fire. The clinkers will not burn and must be pulled out at the first stop. A fire with a hole in it was then shown. There was no black smoke escaping from the firebox, as the large amount of air admitted through the hole reduced the firebox temperature below the splitting up point of the gases.

Still another view emphasized the fact that with the pop valves open, 15 lb. of coal is wasted per minute, which is at the rate of

about half a ton an hour. Chemical analyses were also shown of a number of the coals which are used on the system.

At the close of the lecture, a number of those present had questions to ask, and the lecturer emphasized the fact that no rule could be laid down for the proper thickness of the fire, as it depends entirely upon the service conditions. A ruling of the supreme court in the case of damage to property from the smoke nuisance was read and the men were shown the necessity of giving special care to the prevention of smoke. They were also asked to cultivate the natural knack in handling the scoop whereby the heel of the scoop, striking the ring of the door, distributes the coal in a fan shape manner. This was followed by a short talk on the necessity of team work between the engineer and the fireman and how it might best be brought about.

INSTRUCTION BOOK AND FUEL RECORDS

Division officers, locomotive engineers, firemen, hostlers, shop engineers and firemen, in addition to the lectures, are furnished with an instruction book on the use of fuel, which is the standard practice of the company. The book describes quite plainly the principles discussed in the lectures and the instructions given in the car. In addition to the work done on the fuel instruction car, fuel economy and fuel records are discussed monthly at all division staff meetings. These individual fuel records are kept according to classes of service and show the gross ton miles per ton of coal, both in eastward and westward directions, and also the total. The individual records are posted on the bulletin boards in the engine houses and are much discussed among the officers and the men. Each master mechanic is furnished with reports of fuel performance daily and by these reports is enabled to immediately follow up any poor performance. The lectures are attended to the capacity of the fuel instruction car and frequently are visited by municipal and state authorities, including representatives of the various colleges throughout the Northwest.

DESCRIPTION OF CAR

The fuel instruction car has been fitted up from an ordinary coach. One end is partitioned off to provide sleeping quarters and an office for the operator. It is equipped with acetylene apparatus for providing light for the car and for the stereopticon. A supply of gasoline is provided to furnish gas for the bunsen burners; otherwise very little special equipment is needed other than that shown in the illustrations.

In addition to the cards on the side wall of the car, which have been quoted in the article, are the following:

"Remember that the reverse lever is to shorten the cut-off as well as to reverse."

Accompanying a prospective drawing of a 7-in. cube were the words, "This represents the size of a lump of coal wasted by the pop being open one minute."

"The pop valve open one minute on an engine carrying 200 lb. of steam will blow away the equivalent of 15 lb. of coal."

"The fireman who gives thought to efficiency saves labor for himself."

"Use your head as well as your muscles in your work. You will earn your salary more easily."

"Smokestack expansion is extravagant. Hook up and get expansion in the cylinder."

"Do not forget to hook up the lever when backing up. It works both ways."

"Burning is the rapid chemical combination of oxygen with a fuel."

'Any substance that will combine rapidly, chemically with oxygen is called a fuel."

"A compound is a substance from which you get something other than itself by some process or treatment."

"An element is a substance from which you cannot get anything other than itself by any process or treatment."

"One pound of carbon imperfectly burned to carbon monoxide (CO) produces only 4,500 B. t. u."

"One pound of carbon burned perfectly to carbon dioxide (CO_2) produces 14,500 B. t. u."

"Twenty pounds of air are required to burn 1 lb. of coal in a locomotive. One pound of air occupies 13 cu. ft."

"Light and frequent firing saves coal, reduces your labor and keeps up pressure."

"Black smoke is the unburned carbon of the gases and represents a loss of 14,500 B. t. u. for each pound escaping."

"One British thermal unit is the amount of heat required to raise 1 lb. of water at a temperature of 39 deg. F. one degree."

"One pound of hydrogen burned to water (H_2O) produces 62,000 B. t. u."

"The man that never says I can't, but I can, always succeeds."

"Team work between engineer and fireman is essential to fuel economy."

"Shake grates often enough to keep them open. Fire shaken into the ash pan is a loss."

"Raking the fire causes clinkers; therefore put the fire where it should go with the scoop."

"Closing fire door quickly after each shovelful saves coal, firebox sheets and flues, and prevents clinker formation."

INSURANCE OF BAGGAGE IN ENGLAND

Passengers traveling by rail in England can now insure baggage with the Travellers' Baggage Insurance Association. Insurance tickets are sold at the principal ticket offices of a number of prominent railways. The baggage may be insured for $100, $200, $300 or $500, and for periods of 15, 30 or 60 days. Thus, for a shilling (25 cents) the passenger can buy a ticket which insures his baggage for 15 days for $100; and the policy covers all places, not only railroad trains and stations, but also hotels, steamers, and all situations, apparently, except the passenger's own home. No declaration is required in applying for tickets. Among the conditions of insurance, those peculiar to this kind of insurance read, in substance, as follows:

That insurance shall apply to the whole of the baggage of the assured and not to any particular part thereof, and should the total value of such baggage be greater than the sum insured, then claims shall be paid only in proportion to the amount insured.

That valuables such as Jewellery, Watches, Articles of Gold and Silver, Field Glasses, Cameras and Articles of Vertu, are only covered to the extent of one-fourth part of the total amount of the insurance effected, and that no claim is recoverable in respect to any one article of the description mentioned in this paragraph for a greater sum than ten pounds.

That Cash, Notes, Travel Tickets, Bonds or Securities of any kind are not covered, or loose articles such as Sticks, Umbrellas, Rugs or Straps, or any property whilst being worn on the person. No claim is recoverable for delay in transit and loss shall not be presumed in respect to missing baggage until after the lapse of a period of thirty days. . . .

Insurance does not cover damage to any trunk or package itself, or breakage of any articles unless the same is caused by fire, or by accident to the conveyance by which the property insured is being conveyed.

The assured shall observe ordinary and proper care in the supervision of his or her baggage.

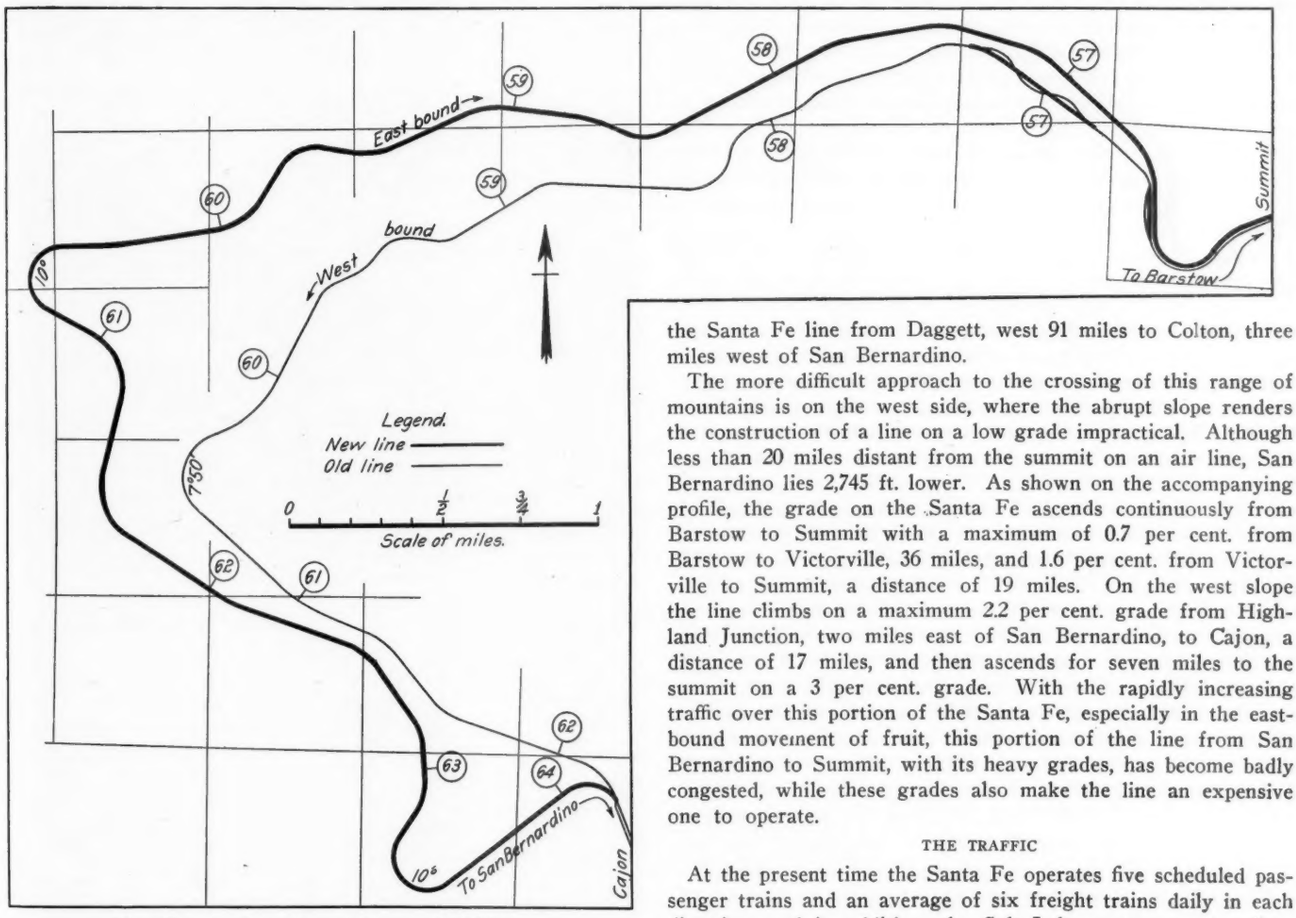
No claim is recoverable for a lesser sum than ten shillings.

CHALK BRIQUETTES AS FUEL IN ENGLAND.—The Leeds briquette works at Hunslet has recently been making experiments to determine the possibility of the use of chalk briquettes for fuel. It is said that the company is able to obtain its chalk in the south of England at a cost of from 14 to 25 cents per ton, and that it is proposed to sell it in briquette form at from $3.75 to $5 per ton. The briquettes are 5 in. long, 4 in. wide and 2½ in. thick. It is claimed that they burn with little or no smudge, with an exceedingly small amount of ash and that they give off from 40 to 50 per cent. less smoke than coal. If the idea should prove as successful as seems possible from the foregoing it will be a large step towards the solution of the smoke problem.

New Santa Fe Line Near San Bernardino, Cal.

A Second Track Is Being Built on West Approach to Cajon Pass, Reducing Grade from 3 to 2.2 Per Cent.

The main line of the Atchison, Topeka & Santa Fe from Chicago to Los Angeles and other southern California points, crosses the San Bernardino mountains through Cajon pass about 25 miles east of San Bernardino, Cal., at an elevation of 3,821 ft. This range of mountains extends northwest and southeast at right angles to the general direction of the Santa Fe and forms a serious barrier to the entrance of railways into southern California from the northeast, the only other railway entering this portion of the state on its own rails being the Southern Pacific which skirts the southern end of this range from Yuma, Ariz. When the San Pedro, Los Angeles & Salt Lake was built in 1904, the expense of securing another line through these mountains prompted this road to arrange to use the Santa Fe line from Daggett, west 91 miles to Colton, three miles west of San Bernardino.



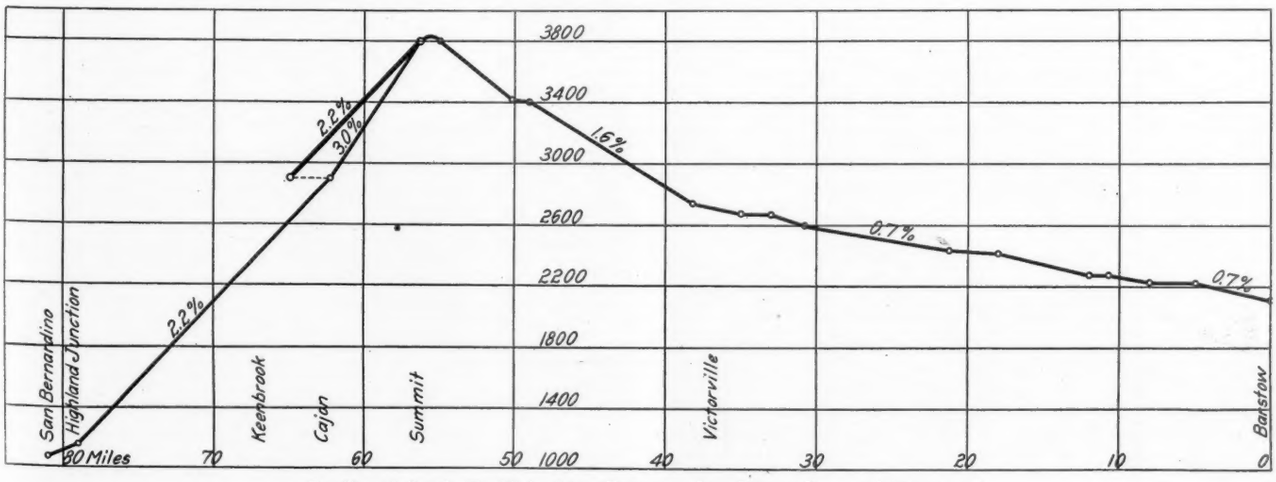
Map Showing Location of New and Old Lines

The more difficult approach to the crossing of this range of mountains is on the west side, where the abrupt slope renders the construction of a line on a low grade impractical. Although less than 20 miles distant from the summit on an air line, San Bernardino lies 2,745 ft. lower. As shown on the accompanying profile, the grade on the Santa Fe ascends continuously from Barstow to Summit with a maximum of 0.7 per cent. from Barstow to Victorville, 36 miles, and 1.6 per cent. from Victorville to Summit, a distance of 19 miles. On the west slope the line climbs on a maximum 2.2 per cent. grade from Highland Junction, two miles east of San Bernardino, to Cajon, a distance of 17 miles, and then ascends for seven miles to the summit on a 3 per cent. grade. With the rapidly increasing traffic over this portion of the Santa Fe, especially in the eastbound movement of fruit, this portion of the line from San Bernardino to Summit, with its heavy grades, has become badly congested, while these grades also make the line an expensive one to operate.

THE TRAFFIC

At the present time the Santa Fe operates five scheduled passenger trains and an average of six freight trains daily in each direction, and in addition, the Salt Lake route operates three passenger trains and an average of three freight trains daily in each direction, making a total of thirty-four trains.

Westbound tonnage freight trains require one helper to the summit; eastbound, all passenger trains of five cars or more re-



Profile of Santa Fe Main Line Between San Bernardino and Barstow

quire a second engine, with a third engine on the longer transcontinental trains of over ten cars. Freight trains with 1,750 tons require two Santa Fe type 2-10-2 class locomotives as helpers in addition to the road engine, from San Bernardino to the summit. Several Mallet locomotives have recently been placed in service on this hill and with one of these locomotives and a Santa Fe type as helpers, the tonnage can be raised to 2,000 tons. Two Mallet helpers with a road engine will take 2,600 tons up the mountain. Three engines are regularly assigned to helper service for Santa Fe passenger trains and an average of four are required in freight service, although these are not definitely assigned, but are ordered out of San Bernardino as required. The Salt Lake maintains six helper engines regularly for all service between San Bernardino and Summit. In addition they are run over to Victorville to help trains westward when necessary.

With the heavy train movement, the delays in getting the helpers back have been very heavy and it has been impossible to get the maximum service from them. Likewise, these heavy grades have required the adoption of special precautions to insure safe operation, which, in themselves, have added to the delay to train movements. All trains are stopped at the top of the hill while brakes are tested. The speed of passenger trains between Summit and Keenbrook is limited to 30 miles per hour, while freight trains are limited to 15 miles per hour to Cajon and 20 miles from Cajon to San Bernardino. In addition all freight trains are required to stop 10 minutes at Cajon and Devore to cool the wheels.

GENERAL CHARACTERISTICS OF THE NEW LINE

These conditions led to the construction of additional facilities. As the Santa Fe lines radiate from San Bernardino west in several directions, trains are assembled at this point for movement east, and the improvement began at the east end of the yards. Second track was built two years ago, from San Bernardino to Cajon on the existing 2.2 per cent. maximum grade. Between San Bernardino and Cajon the alinement was materially improved by the elimination or reduction of a number of curves. East of Cajon a new line was built last year to Summit on a 2.2 per cent. grade entirely separate from the present line. It was built for single track only for up-grade traffic, leaving the old line to be used for westbound traffic exclusively. Connecting at Cajon with the 2.2 grade from Highland Junction this gives a continuous 2.2 per cent. grade for 25.4 miles between Highland Junction and Summit on the eastbound track, while the westbound mileage between Summit and Highland Junction will be 23.5. As the new line lies to the north of the old, trains necessarily operate left-handed between Summit and Cajon, and this practice is continued along the double track line from Cajon to San Bernardino, to eliminate crossing over at Cajon.

The most important economy derived from the new line is, of course, in the reduction in the number of helper engines required. One engine is eliminated on all passenger trains of five cars or more, while freight trains are made up at San Bernardino for movement over the summit without breaking up or the putting on of additional power. Two Santa Fe type engines are able to haul 1,400 tons and two Mallet 2,600 tons. The delay in returning helper engines is almost entirely eliminated. It is also possible for the Santa Fe type locomotives to make a round trip between San Bernardino and Barstow under the 16 hour law.

View Near West End of Line

The increased facility of train movement is evidenced by the plan to eliminate one despatcher on each trick.

Starting with a level grade for 3,500 ft. through the yard at Summit the old, or westbound, line is straightened for a mile. The new line parallels the old for this distance, and then gradually swings to the north until at its maximum divergence four miles west it is nearly a mile distant from the old line. It returns to the other line at Cajon. As it is built in order to secure a lower grade, it is, of course, longer than the old; the increase in length being 10,230 ft. The maximum degree of curvature on both the old and new lines is 10 deg., although the total amount of curvature on the new line is 135 deg. more than on the old. All curves on the new line are compensated at the rate of 0.04 per degree. Where the tracks are built parallel they are spaced

View of New Line from Top of Tunnel No. 2

Typical View of Cut

14 ft. center to center except on curves of 6 deg. and over, where they are spread to 15 ft. between centers.

GRADING

The grading from Cajon to Summit, including the revision of the old line at Summit, was let in one general contract. The amount of material moved was estimated at 1,100,000 yd., of which 150,000 yd. was solid rock and 300,000 yd. loose rock. The contract provided for the classification of materials and also included the masonry work and the lining of tunnels. Work was started in November, 1912, and this line was put in service November 1, 1913. The grading was carried on largely by team forces, over 250 teams having been employed. Only two steam shovels were used, while considerable work along the operated line was done by extra gangs of section men. The absence of heavy equipment was unusual on work of this magnitude, but was due largely to the difficulty in getting it in onto the new line.

The section work along the main line near the summit introduced a number of difficulties in handling this material in such close proximity to traffic without at the same time seriously interfering with it. In many instances the material had to be moved across the track. It had to be shot down in small quantities and handled quickly. As shown in one of the photographs, teams with slip scrapers were frequently employed to drag the material out of the way after it was shot down.

Moving Material Across Main Track with Teams

In the rock cuts on the new line it was found that one slope weathered much more than the other due to the inclination of the strata and that the weathering decreased as the steepness of the slope increased. The slope generally used in such cuts was ½ : 1. In two or three instances slides were encountered in rock cuts. As a soft stratum was cut through, the material above it on the side sloping towards the cut was loosened and all the material above this stratum came in. In one instance 15,000 yd. slid in in this manner, and in another instance 8,000 yd. slid. In building the fills, side shrinkage only was added. The roadbed was built 20 ft. wide on fills and 28 ft. in cuts.

In one 45,000-yd. cut a short distance north of Cajon an unusually hard rock was encountered, differing materially from that in adjacent cuts. After spending $0.46 a yard in shooting this material twice heavily, the contractor only succeeded in breaking it into blocks of from 20 to 50 yd. each. It was then necessary for him to further shoot it into smaller chunks so that the cost for breaking it up alone exceeded $0.60 per yard.

Two tunnels 380 ft. and 400 ft. long were constructed about three miles below the summit. The first one was driven from a top heading of full arch section carried down to the springing line. The remainder of the material was removed in a single bench about 75 ft. behind the top heading and preceded by a small drift driven a sufficient distance ahead on grade to provide tail room for small cars into which the material from the top heading and bench was dumped. The other tunnel was driven from a top heading of the full width. This was followed by a bottom drift of half width extending up half way to the springing line, and then by a bench removing the remainder of the material. A comparison of the results obtained by the two methods showed the latter plan of three headings to be the most satisfactory under these conditions.

Both tunnels were timbered as built and were lined with concrete after the bores were completed. In installing the concrete lining, one 20 cu. ft. batch mixer was located at each end of the tunnel. The batches were elevated to platforms built at the elevation of the springing line and extending through to the tunnel. The concrete was dumped into wheelbarrows which were in turn emptied directly into the side forms or onto platforms from which the concrete was shoveled into the arch ring. The side walls were built continuously from end to end of the tunnel up to the springing line. The arch ring was built in 6 ft. sections. The lining was not reinforced except for 50 ft. at each end, where ¾ in. bars were inserted.

OTHER DETAILS

Two girder structures with ballasted floors were built across Cajon creek near the west end of the line. The first one north of Cajon consists of two 75-ft. through girders on concrete piers, and is built on a 10-deg. curve. The other one consists of four 40-ft. through girders on concrete piers. One 20-ft. I beam structure is the only open floor bridge on this line. Eight arches of various sizes were built in addition to numerous concrete pipe culverts. The arches are of mass design, non-reinforced. The concrete pipe used is of a patented reinforced design with a lock joint which was grouted after placing, and was furnished by the Los Angeles Reinforced Pipe Company, Los Angeles, Cal. Where two or three strings of pipe were laid side by side, a minimum distance of 2 ft. was maintained between the two pipes and the ends were connected with a concrete headwall.

The new track was laid with 90-lb. rail and Weber joints with tie plates on all ties. Japanese oak ties were laid continuously on all 10-deg. curves, and were laid alternately with cedar ties elsewhere. One passing track 3,000 ft. long between head blocks is located on the new line midway between Summit and Cajon. Automatic signals will be installed on both tracks. The signals will be lighted with electricity while the same power will be utilized to light facing point switches as well as section houses and depots.

The location and construction of this new line were begun under the direction of C. A. Morse, formerly chief engineer, Santa Fe system, and continued under his successor, C. F. W. Felt; G. W. Harris being chief engineer, Coast Lines, and M. C. Bryan, division engineer. A. F. Robinson, bridge engineer, Santa Fe system, was in general charge of the design of the bridges. B. J. Simmons and F. H. Mudge were resident engineers in direct charge of the work. The Sharp-Fellows Contracting Company at Los Angeles, were contractors for this work.

Rules Governing Weighing of Carload Freight

Code Agreed to By Committees Representing Shippers and Carriers. To Be Submitted to the Commission

A complete code of rules governing the weighing and reweighing of carload freight, formulated by the special committee on weighing of the National Industrial Traffic League, and the sub-committee on weighing of the Committee on Relations between Railroads of the American Railway Association, was approved by the league at its meeting in Cleveland on April 24. The code of rules will now be submitted to the American Railway Association at its meeting in May, and if approved will then be presented to the Interstate Commerce Commission for approval. The rules were agreed upon by the committees of the two associations at a meeting on March 31, after a number of conferences, following the issuance of the opinion of the Interstate Commerce Commission (28 I. C. C. 7) in connection with its general investigation of weighing practices. The rules as formulated are the result of many compromises between the representatives of the carriers and of the shippers, and it is expected that their operation will disclose necessary changes and amendments, but it is believed that substantial progress has been made in carrying out the ideas expressed by the commission in its opinion. The League committee on weighing, of which Oscar F. Bell, traffic manager of Crane Company, is chairman, has been made a standing committee of the league for the purpose of continuing negotiations with the committee of the American Railway Association as to changes, thus affording a permanent plan for the working out of these rules similar to that in effect as to demurrage and storage charges.

The special committee of the league, in its report on the rules, explained that the reference in the introductory paragraph to the rules and regulations of individual lines was inserted because of the insistence of the carriers, who agreed, however, to add the words "as filed with the Interstate Commerce Commission." There are certain local conditions which must be covered by special rules, and the committee felt that the provision for filing such special rules with the Interstate Commerce Commission was full protection against unwarranted or unreasonable rules or practices.

With respect to Rule No. 3, the committee invited attention to the fact that an agreement has been reached providing that cars may be weighed in motion, only when uncoupled and free at both ends and alone, upon scales properly designed for such weighing. Provision is made for using the actual tare of the car, in place of the marked tare, when it has been ascertained before loading or after unloading.

As to Rule 6, providing for notification of weights, the committee called attention to the fact that this does not contemplate that request must be made for each shipment, nor that such request must be in writing, but is understood to mean that a blanket request may be made upon the carrier when consignor desires to be advised of original weights and changes made therein. The committee of the league was at first inclined to hold out for a provision that notification should be made in all cases, and the commission in its opinion even suggested that such notification should be made by telegram.

Rule No. 7 provides for keeping a record of the manner of weighing cars and making proper notations on way bills and freight bills. In its recent report recommending the adoption of a standard form of freight bill, the commission has included a rule providing that when charges are assessed on track scale weights the gross, tare and net weights must be shown.

The question of tolerance was one which required a great deal of discussion before an agreement could be reached. The shippers' committee originally suggested a tolerance of 1 per cent. with a minimum of 500 lb. on all freight except as to commodities loaded in open cars, on which it agreed to accept a tolerance of 1 per cent. with a minimum of 1,000 lb.; but in addition to this, the committee further insisted that in case the difference in freight charges based upon the difference in weight was 50 cents or more, the billing should be corrected. This was later changed to $1 or more. The committee felt that in the case of commodities taking a high rate of freight 1 per cent. of the load with a minimum of 500 lb. was too great a tolerance; as for example, where the rates run from $1.50 to $3 per hundred pounds, that tolerance would preclude any changes for a difference in freight charges amounting to from $7.50 to $15 per car. The carriers would not consent to this so-called money tolerance and it was finally decided to agree upon the code of rules without such provision; and that the code of rules so agreed upon, when approved by the respective organizations, should be presented to the commission jointly, with a separate recommendation on behalf of the league that this money tolerance be included. The paragraph suggested by the committee reads as follows: "The tolerance under Section D shall be 1 per cent. of the load with a minimum of 500 lb. or a difference in freight charges of $1, based upon the difference in weight." The carriers originally proposed applying point of origin weights on coal and coke; they then changed their position and proposed a tolerance of 1 per cent. with a minimum of 1,000 lb. on all coal and coke; later they accepted a tolerance of 1 per cent. with a minimum of 500 lb. on all coal and coke, except when loaded in open cars, on which they contended the tolerance should be 1 per cent. with a minimum of 1,000 lb. It is expected that the initial carriers will ascertain the amount of evaporation from their various mining districts and publish it in their tariffs, and where this has not been done the tolerance of 1 per cent. with a minimum of 500 lb. will govern regardless of evaporation.

Arthur Hale, for the American Railway Association, and O. F. Bell, chairman of the League Committee, will draft a definition of the term "tolerance" to be added as a note to Rule 8.

Under Rule 9 no specific charge is provided for the weighing of cars for the reason that no uniform charge that could fairly be applied in all sections of the country could be determined.

The code as agreed upon by the committees and approved by the League follows:

Introductory Paragraph

These rules do not change or amend the rules, minimum weights or estimated weights provided in tariffs or the classifications governing the tariffs, nor the rules and regulations of the individual lines as filed with the Interstate Commerce Commission.

Rule 1.—Supervision of Scales

When weights obtained on railroad or private scales are used for the assessment of freight charges, such scales shall be maintained, tested and operated in accordance with the Track Scale Specifications and Rules approved by The American Railway Association.

Rule 2.—Weights—By Whom Ascertained

Weights should be ascertained by competent employees after proper instruction and under proper supervision.

Rule 3.—Weights—How Ascertained

Section A.—When track scale weights are used for the assessment of freight charges, weighing must be done by or under the supervision of the carriers or their representatives or under properly supervised weight agreements.

Section B.—Cars may be weighed at rest:

(1) When uncoupled and free at both ends.

(2) When coupled at one end and free at the other end, only at points where the scale rails are level and approach rails level for a distance of 50 ft., and when the scales are kept in first class condition.

Section C.—Cars may be weighed in motion, only when uncoupled and free at both ends and alone, upon scales properly designed for weighing in motion and in charge of a competent weighmaster.

Section D.—Cars loaded with long material extending from one car to another may be weighed coupled at rest. They may also be weighed coupled in motion on scales of sufficient length to properly weigh together the cars so coupled.

Section E.—When the actual tare of a car has been ascertained immediately before loading, it shall be used in lieu of the marked tare, except as provided in Section F.

Section F.—If a loaded car upon arrival at destination is weighed and the actual tare is ascertained after the entire lading of the car has been removed including all packing and the debris resulting from that lading, it shall be used in lieu of the marked tare. If the car is reloaded by the consignee, actual tare obtained in like manner may be used.

Section G.—The marked tare should be used to arrive at the net weight of the load, except as provided in Sections E and F of this rule.

RULE 4.—WEIGHTS—WHERE ASCERTAINED

Carload freight should be weighed at point of origin, or as near thereto as practicable.

RULE 5.—WHEN CARS MAY BE RE-WEIGHED

Section A.—When the lading has been transferred en route, where car has met with an accident, or where for other reasons there is evidence of loss in transit, the carriers will, when practicable, re-weigh the car.

Section B.—Carload freight may also be re-weighed en route or at destination for the information of the interested carriers and to test the accuracy of the previous weighings. (See Rule 8.)

Section C.—When request is made by consignor or consignee for the re-weighing of any car, such re-weighing shall be done, whenever practicable, the car to be weighed again if necessary—subject to Rule 9.

RULE 6.—NOTIFICATION

Upon request the consignor will be furnished with the gross, tare and net weights and all changes made therein.

RULE 7.—INFORMATION TO BE SHOWN ON SCALE RECORD, WEIGHT CERTIFICATE, WAY-BILL, FREIGHT-BILL, ETC.

Section A.—A record should be kept at each track scale showing the gross, tare (whether actual or stenciled), and net weight; the date and time of weighing; the condition of the weather; whether weighed at rest or in motion; coupled at one or both ends or uncoupled; when actual tare is used, estimated amount of debris in the car.

Section B.—The point at which car is weighed and the gross tare and net weights will be noted in ink or indelible pencil on regular way-bill and slip-bill or card-bill. When actual tare is used instead of marked tare it should be so specified (see Rule 3). The method of ascertaining the weight should also be specified as Railroad Scale, Weighing Bureau, Shippers', Tariff, Classification or Agreement Weight. This information must also be shown on transfers to connecting line, on correction sheets when issued, carried on way-bills to destination, and shown on freight bills.

Section C.—When track scales are equipped with registering or recording device and sticker form of scale tickets is used, said tickets may be used in same manner as provided above and if space is provided thereon, the information shown in Section A will be added.

Section D.—Where side cards are provided for the purpose, weights should be endorsed thereon.

Section E.—In case agent at point of origin receives request from consignor for the result of weighing or reweighing, proper notation should be made on billing accompanying the car to destination. (See Rule 6.)

Section F.—Where weights are obtained for billing purposes under weight agreements, which do not provide for use of the gross and tare weights, the gross and tare weights need not be shown as provided in Sections B, C and D.

RULE 8.—WEIGHTS TO GOVERN AND TOLERANCE

Section A.—Where carload freight, the weight of which is not subject to change from its inherent nature, is check-weighed or re-weighed en route or at destination, no correction will be made in the billed weight except as provided below:

Section B.—If the difference between the original net weight and the weight obtained by re-weighing does not exceed the tolerance provided in this rule, the first weight will not be changed. If such difference exceeds the tolerance, the car should be weighed a third time if practicable. If the third weighing confirms the original weight within the tolerance no change shall be made. Where the original weight cannot be applied as above, the lower of the second or third weights shall be used where the difference between the second and third weights does not exceed the tolerance.

Section C.—In deciding between weights obtained on track scales as to which is the more correct, all of the conditions under which the several weighings were done must be taken into consideration, including the class of scale, condition, how recently tested, the manner of weighing, whether car was at rest or in motion, coupled or uncoupled, actual or stenciled tare used, the time of weighing, weather conditions and the reliability of the weigher, giving precedence to that weight obtained under the best conditions.

Section D.—The consignor or consignee shall be permitted to show the actual weight of any carload shipment either by means of shipper's authenticated invoice or by weighing the entire load on platform scales, or by so weighing a proper portion of uniform or standard weight articles (not less than ten (10) per cent. of the lading), weighing to be performed under supervision of the carrier; provided such total weight includes all blocking, packing and debris resulting from the lading in question. This actual weight will be used to determine freight charges (subject to weight agreements if applicable), provided the difference in weight exceeds the tolerance.

Section E.—The tolerance shall be one per cent. (1%) of the lading, with a minimum of 500 lb., on all carload freight, including coal and coke, except that when ashes, cinders, clay, dolomite, ganister, gravel, mill-scale, ore, sand, slag, all stone (not cut), and similar bulk freight, brick and soft drain tile are loaded in open cars, the tolerance shall be one per cent. (1%) of the lading with a minimum of 1,000 lb.

Note:—Tolerance on coal and coke does not include difference in weight due to evaporation which shall be determined and published in initial carrier's tariff.

Section F.—Weights of commodities subject to shrinkage in weight from their inherent nature, properly obtained at or near point of origin, should not be changed, except as provided for in the tariffs of the carriers. If obvious error is discovered, each case should be dealt with upon its individual merits and report made to the originating carrier with all the facts.

RULE 9.—CHARGES FOR WEIGHING AND RE-WEIGHING

Section A.—When weights are obtained for the assessment of freight charges, no charge will be made by the carrier for the service.

Section B.—When a car is weighed or re-weighed, either empty or loaded, at request of either consignor or consignee, the service and charges will be in accordance with conditions named below, subject to the rules and carload minimum weights prescribed in tariffs and classifications.

Section C.—When a shipper or consignee requests that a car containing a commodity which is not subject to shrinkage from its inherent nature be re-weighed, this service, wherever practicable, will be performed by the carrier without charge, provided such re-weighing discloses error in the billed weight of more than the tolerance provided in Rule 8. When a car contains a commodity which is subject to shrinkage from its inherent nature, no charge will be made if the billed weight is changed, as per Rule 8, Section F.

Section D.—When a car is weighed or re-weighed either empty or loaded at request of either consignor or consignee, a charge will be made each time car is weighed: (except as provided in Sec. C.)

(1) On private scales located at the industry $——— per car.
(2) On other private scales, conveniently located $——— per car. (See note.)
(3) On railroad company's scales, conveniently located $——— per car.

Note:—The parties desiring the weighing done must make their own arrangements with the owners of the scales for their use, the charge of $——— covers only the weighing service performed by the carrier.

Section E.—When inbound freight is weighed or re-weighed by a switching line (not participating in the freight rate) the above charges will be assessed, regardless of any variation in weights, and will be in addition to the regular switching charge. If no change is made in billed weight, the charge will be against the party or road requesting weighing; when change is made in billed weight the charge will be made by the switching line against the delivering road.

Section F.—When carload shipments which are provided for in classification and tariffs at fixed or estimated weights are re-weighed at the request of consignor or consignee the above charges will be assessed, regardless of any variation in weight.

Section G.—When carload shipments are billed at minimum carload weight and are re-weighed on request of consignor or consignee, the above charges will be assessed, unless the variation in the weight increases the freight charges.

RULE 10.—WEIGHT AGREEMENTS

Section A.—When shippers' weights of property are accepted and applied by the carriers under weight agreements, properly supervised, such weights should be designated in the prescribed manner on waybills, shipping tickets, bills of lading, or weight certificates (See Rule 7, Section B), and the property should not be re-weighed, except as provided in Rule 5. Proper supervision means checking of the records of the shipper by the authorized representative of the carrier to verify the weights and descriptions furnished, and the weighing of a sufficient number of cars for verifications.

Section B.—When investigation, through examination of the shippers' records, or by re-weighing, discloses error in weights or description shown on original billing the charges shall be adjusted to the proper basis, and notice of such change shall in all cases be transmitted to the interested carriers or their representatives.

Section C.—Forms of weight agreement suitable to the character of the business tendered for transportation shall embrace the following general principles and copies thereof shall be filed with the Interstate Commerce Commission. The agreements shall be in writing and provide that:

(1) The shipper shall report and certify correct gross weights (except where estimated weights are provided in tariff or classifications), and correct description of commodities on shipping tickets, bills of lading or weight certificates and correct gross tare and net weights when obtained on track scales, where such weights are used for billing purposes.

(2) The shipper shall allow the authorized representative of the carrier to inspect the original weight sheets, books, invoices and records necessary to verify the weights and description of the commodities certified in the shipping tickets, bills of lading or weight certificate.

(3) The shipper shall promptly pay to the authorized representative of the carrier bills for all undercharges resulting from the certification of incorrect weights or improper description.

(4) When weights of uniform or standard weight articles are based upon averages, the shipper shall give prompt notice to the authorized representative of the carrier when any change is made in the package or material used which will affect the weight arrived at by use of the average.

(5) The shipper shall keep in good weighing condition any and all scales used in determining weights and have track scales tested, maintained and operated in accordance with the Track Scale Specifications and Rules approved by the American Railway Association and shall allow the authorized representative of the carrier to inspect and test them.

(6) The agreement may be canceled by 10 days' notice in writing to either party.

(7) All shipments made under the agreement will be subject to rates and charges prescribed by classification, tariffs or rules of the carriers interested.

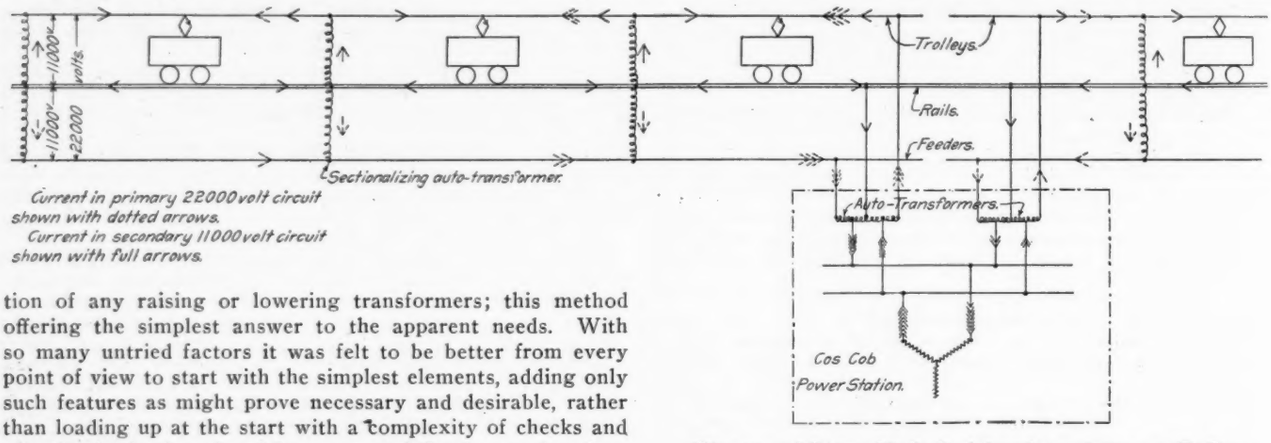
New Haven Improves Method of Electric Operation

Improved Single Phase System Eliminates Inductive Disturbances and Raises the Transmission Voltage

By William Arthur

Assistant Engineer, with McHenry & Murray, Engineers, New Haven, Conn.

On the night of January 24, 1914, the New York, New Haven & Hartford, operating the largest electrified system in the world, made important changes in its method of supplying energy to its trains. When the decision as to the system to be adopted for this electrification was made eight or nine years ago, regard for its location as a part of the main artery of a big system; a careful consideration of the nature of its traffic, as well as the long distances and large range of operation which ultimately would have to be negotiated, led to the adoption of the single phase system as offering the most flexible and economical solution of the many problems involved. At that time experience with important electrified steam railroads operating at more than a few thousand volts was meager. The New Haven engineers decided upon 11,000 volts as the working pressure. This was a radical departure, and necessarily introduced many new problems and difficulties, but the need of a high voltage alternating current in an overhead wire was imperative. It was further decided to supply the 11,000 volts from the generator terminals directly to the contact wire without the interposition of any raising or lowering transformers; this method offering the simplest answer to the apparent needs. With so many untried factors it was felt to be better from every point of view to start with the simplest elements, adding only such features as might prove necessary and desirable, rather than loading up at the start with a complexity of checks and counter-checks based solely upon undefined apprehensions which later might prove to be only expensive frills.



Current in primary 22000 volt circuit shown with dotted arrows.
Current in secondary 11000 volt circuit shown with full arrows.

Diagram of Direct Method of Supplying Power to Trolley Originally Used on the New Haven

As detail weaknesses developed they were remedied by the engineers in charge with the result that the possibilities of the new system were fully developed and realized, and, with equal frankness, be it said that the limitations of the arrangement as originally conceived were also established. After four years, two difficulties remained. One was a need for more positive correction of electro-magnetic disturbances in neighboring telegraph and telephone circuits—a large number of which parallel the railroad tracks. Corrective measures had been applied at an early stage, and in general had proved quite successful. The growing volume of business, however, necessitating larger currents, considerably increased these effects, especially when grounds or short circuits occurred. It would have been feasible to continue to add to the number of neutralizing transformers and other corrective apparatus, but it was felt to be better to try and remove the cause.

The other need was related to the transmission voltage. As already stated, the pressure at the generator terminals and on the overhead wires was 11,000 volts. Generators cannot be economically built for much higher voltages. Ideas of what constitutes a high transmission voltage have changed rapidly, and although 11,000 volts had at one time seemed radical, it is now no longer so. It was anticipated that needs would arise for much higher voltages than were originally conceived, but the direct connection between generator and line limited this possibility. The rapid growth of the business, accompanied by a large extension of the range of operation, which took place when the Harlem river branch and freight yards were added, and the decision to extend electrical operation to New Haven, a further distance of 45 miles, emphasized this. The difficulties, however, in the way of raising the transmission voltage were considerable, since it meant that the insulation on approximately 350 of a total of 572 miles of overhead contact wire with the rolling stock and other apparatus apparently would need to be replaced. After much searching a solution was found, which, it appeared, would simultaneously solve both problems in a simple manner.

One of the accompanying diagrams shows that under the old system all of the current flowing either in the overhead wire or in the rails and ground return, was in the same direction for the greater part of the track involved, and thus its electro-magnetic effect was cumulative with reference to the adjacent paralleling wires. Referring to the other diagram, it will be seen that under the new arrangement, auto transformers, situated in the power station and having their centers grounded to the rails, are interposed between the generators and the contact wire. The terminal voltage of the generators, as before, is 11,000 volts. The transformers raise this to 22,000 volts. One terminal of the transformer is carried to the contact wires and the other to feeder wires, which were previously used to parallel the contact wires.

At distances of a few miles along the main line, and located usually with reference to an already existing anchor and sectionalizing bridge, are outdoor type auto transformers. These in turn have their centers connected to the rails, one terminal being connected to the contact wire and the other to the feeder wire. The total line is therefore broken up into sections of short lengths. Any train draws current from the transformers on either side of it, and, when it is midway between transformers, half of this current will complete its circuit through the rails and ground in one direction, and the other half through the rails and ground in the other direction, thus tending to neutralize its electro-magnetic effect upon adjacent telephone or telegraph circuits. In case a train is situated nearer to one transformer than to the other, it will draw the greater part of its current from this transformer and the smaller portion of its current from the

more distant one. The net result, however, is the same, for the larger current multiplied by the shorter distance is balanced by the smaller current multiplied by the larger distance.

What is true electro-magnetically is true also in large measure electro-statically, for since the primary 22,000-volt circuit is made up of the contact wire on one side and the feeder on the other, it is now possible to bring these two wires into the same general position with reference to outside circuits, and thereby balance their electro-static effects, which, obviously, is not possible when one side of the primary circuit consists of the rail and ground return. Electro-static disturbances have always been inappreciable in the New Haven electrification, but this is a valuable consideration in other situations where these effects may be a larger factor.

It is clear that the doubling of the transmission voltage has been effected without increasing the potential stress to ground, for although there are 22,000 volts across the complete circuit, yet from either side to ground there are only 11,000 volts. The arrangement, in fact, represents what is familiarly known in direct current practice as the three-wire system, except that in this instance only one side of the circuit is loaded. There were many good reasons—chiefly difficulties at crossovers and junctions—which led to the utilization of only one side of the circuit. Obviously this arrangement permits of extreme flexibility in the choice of transmission voltage, since across one side of the circuit the voltage may be raised to any practicable figure, leaving the voltage on the contact wires and rolling stock the same. While in this case the auto transformers have a one to one

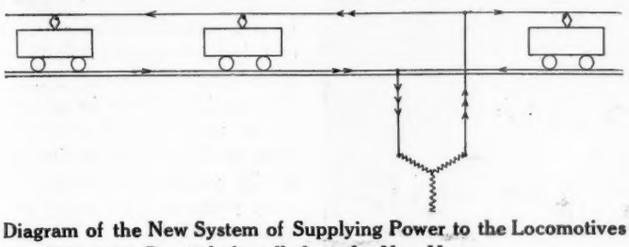


Diagram of the New System of Supplying Power to the Locomotives Recently Installed on the New Haven

ratio, with 11,000 volts across each side, for other conditions it would be quite feasible to use transformers with a ratio of, say, four to one, thus giving a transmission voltage of 55,000 volts, with 11,000 volts on the contact wire.

By the use of an additional wire a two-coil transformer arrangement could be used, which would possess advantages under certain conditions. The underlying principle, however, is the same in either case. Several of the more recent electrification plans, including the Pennsylvania, show the adoption of the two-coil arrangement. It will be noted that the potential stress to ground on the generators at the power house has been materially reduced by the new arrangement.

The transition from one system to the other had to be made without interference with the operation of trains on one of the most congested sections of track in the country. This required the making of many temporary connections and the perfecting of an arrangement which permitted the final changeover to be made easily and quickly. Plans were carefully laid, and each step was prearranged in its proper sequence with relation to all other steps, the preliminary work extending over a period of 18 months.

To make the final changeover simultaneously at the generating station and on nearly 350 miles of track with the minimum interruption to traffic, presented problems of no inconsiderable difficulty. At some points the changes to be made were very small, merely the disconnecting of a few wires and the closing of certain switches, at other points a good deal of work and change was involved. The work required a large number of individuals and gangs situated remotely from each other, and distributed over a large area. These different units had to be tied together through some central exchange, the load despatcher therefore formed a natural clearing house for the issuance and receipt of instructions and reports. The work had to be largely performed in the dark, the early hours of a Sunday morning being chosen on account of the lightness of the traffic requirements at that time. It was arranged that the few trains scheduled to run between the hours of 2 a. m. and 6 a. m. should be hauled by steam locomotives.

Promptly on the appointed minute the generating station was shut down, thus automatically removing power from the whole system. Notification was given by the load despatcher to all concerned that work might be started, and within two minutes the first gang reported its task finished and asked for further instructions. They were told to stand by and await orders. In quick succession came other reports and the same reply was given, then at lengthening periods came the reports from those who had more involved work to do. At 3:09 a. m., i. e., within 69 minutes from the start, the last report was in. Meanwhile work had been going on in the power station itself, where the changes to be made were of course much greater than at any other individual point. At 3:21 a. m. all work within the power station was reported finished.

It now remained to test the results of this work. At 3:23 a. m. the power station operators were told to start up the turbo-generators. At 3:34 the control and three phase circuits were energized by very gradually building up voltage on them. At 3:44 this portion of the apparatus had been tested and found to be all right. The main circuits were now energized, the voltage on these being most carefully but continuously built up by minute accretions extending over a considerable period. Full voltage was obtained at 4:30 a. m. and at 4:45 a. m. the entire system was pronounced ready for load. Trains Nos. 93 and 97, for which steam locomotives had been scheduled, were advised to operate electrically. This was done, the load from these being apparent at 5:25 a. m. and 5:26 a. m., respectively.

The final test, however, would come when a ground took place on one or more of the main track circuits, as this would test not alone the efficiency of the protective devices, but the correct selective functioning of the line control apparatus as well. Under ordinary circumstances several days or even weeks might have passed before a ground occurred, but a wet, muggy night, combined with a steam locomotive which halted and belched steam and smoke under an already defective insulator, hastened matters. In a few minutes the distant insulator grounded. There was a shock and a response; within a fraction of a second the distant circuit breakers had tripped and the line had cleared itself. Following the usual practice, the towerman on the spot again closed the circuit breakers and the short was repeated. The whole apparatus functioned perfectly. At 5:31 a. m. the operating department was advised that full normal service might be resumed.

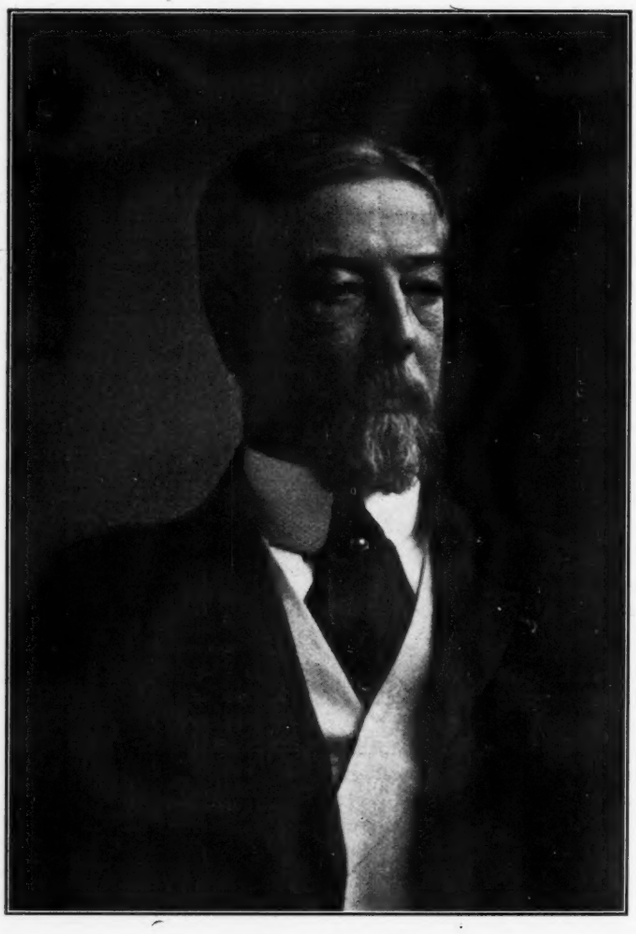
The changes were made under the personal supervision of Wm. S. Murray, consulting engineer. All matters pertaining to the 350 miles of track were delegated to H. Gilliam, who was assisted by Messrs. Tyree and MacKay, while E. J. Amberg was responsible for the important preparatory work and for the internal changes to the power house circuits, in which latter he was assisted by B. Wheeler.

The primary "three-wire system" idea was rough hewn by E. H. McHenry, formerly vice-president in charge of engineering. It was reviewed by Chas. F. Scott, who proposed the arrangement of circuits and transformers, described herein as best suited to the particular conditions, and the engineering adaptation of the general scheme to the existing system was worked out by Wm. S. Murray, formerly electrical engineer. Professor Scott's preliminary calculations had shown the large relief from inductive disturbances which could be expected. The actual results show the relief to be even greater than was anticipated.

GEORGE F. BAER

George F. Baer, president of the Reading Company and of the Philadelphia & Reading Railway and the Central of New Jersey, died at his home in Philadelphia after a very sudden attack of acute gastritis on April 26.

Mr. Baer was a great railroad man in the sense that he was a great executive, a leader of men. Trained as a lawyer, a born fighter, intolerant of sham, sentimentalism and hypocrisy, and with an unusually broad grasp of both the fundamentals and details of the problems which he was called on as a railroad president to face, he had the respect and actual affection of his subordinate officers to a rather unusual degree. He combined a grasp of the detail and an accurate close knowledge of what was going on on his properties with the comparatively rare readiness to delegate authority to those under him from whom he exacted responsibility.



George F. Baer

All of Mr. Baer's work, life and beliefs were strongly influenced by his religious faith in individual responsibility. Mr. Baer was a deeply religious man. It is a rather curious coincidence that hating hypocrisy and cant as he did, Mr. Baer's frequent use of biblical language should have been taken as an indication of affectation. The charge of affectation was wholly without foundation. The Bible and biblical language were probably as much a part of Mr. Baer's life and thought as were the figures and technical terms with which he dealt in the management of his properties. He was quite an unusually hard-headed, practical thinker, and yet he had at times an almost uncanny power of prophecy.

Like a good many other successful men of his generation, he was out of sympathy with many of the present day tendencies toward paternalism and government by nebulous investigation. He was quite out of sympathy with any form of organization wherein responsibility was divided or spread over a committee. A considerable part of his success in life was the result of his ability, as an organizer, and here again the guiding principle appears to have been individual responsibility and authority commensurate with responsibility. He was generally considered a bitter enemy of trade unionism. The following letter, written to the New York *Evening Post* by Robert W. de Forest, points out that it was not against labor unionism as such, but against certain phases of it that Mr. Baer was an uncompromising opponent.

"He was not opposed to labor unions when acting within their own sphere. It was only when they sought to interfere with the right of the non-union man to work on his own terms that his inbred belief in the right of personal liberty asserted itself. His relations to labor leaders were frank and cordial. He met them freely as man to man. They learned to know him and respect him as one who said what he mant and meant what he said. He was courageous—ready to fight, if necessary, in defense of the property interests it was his duty to guard. But the labor leaders knew that if he fought he would fight fairly. George Baer could hit hard but he never hit below the belt.

"His relations to his employees and to laboring men were always close and sympathetic. He was intensely democratic. Mere wealth and mere social standing meant nothing to him. Character meant everything. To him all men of character from the highest to the lowest on the social scale stood on the same plane of equality. Captain of Industry he was, but not a captain who failed to respect the privates who served under him.

"I recall his telling me of the different relations in which he found himself one day several years ago. 'I went to my railroad office in the morning,' said he, 'and was addressed as "Mr. President." Then I went to my grand army meeting and was called "Captain." Later I presided over the trustees of my college and was called "Doctor." In the evening I met my classmates and found myself spoken to as plain "George." 'What I like best,' said he, 'is to be called plain "George." And he was plain George in his attitude toward those who served under him.

"He has, I know been criticized for his frequent use of biblical language. It has been thought an affectation; perhaps even a sanctimonious affectation. But it was not. Biblical language was his every day speech. He was brought up in a home where a chapter of the Bible was read every morning at family prayers. During the early years of his law practice in Somerset county, as he has told me, he and his partners opened the day's work by reading the Bible together. His knowledge of the Bible was unequalled. He used biblical language as naturally and spontaneously as a school boy of today uses slang. If his use of it struck strangely on the ears of a generation that has omitted family prayers and Bible reading from its daily routine, was it George Baer who was at fault?"

George Frederick Baer was born September 26, 1842, in Somerset county, Pa. He got his early education at Somerset Institute, and when he was 13 began work as apprentice printer in the office of the *Somerset Democrat*. After two years' work he went back to school, attending the Somerset Academy and later Franklin & Marshall College. In 1862 he raised a company of volunteers and was made captain of the company and served throughout the war, being promoted to adjutant general. In 1870 Mr. Baer was made counsel for the Philadelphia & Reading, and was later elected a director and became a personal friend and legal adviser to the late J. P. Morgan. He resigned from the Reading directorate when the policy of the company became antagonistic to Morgan interests, but when in 1901 a reorganization of the company took place George Baer was elected president. From that time until his death Mr. Baer was the dominating factor in the anthracite coal situation.

Final Briefs in the Rate Advance Case

Needs for Additional Revenue the Justification for Obtaining This Revenue Through an Increase in Rates

On Monday, April 27, the full Interstate Commerce Commission began the final hearings on the application of the railroads in trunk line and central freight association territory for an increase of 5 per cent. in freight rates. Briefs were filed by the counsel for the railroads, by Mr. Brandeis as counsel for the commission, and by Clifford Thorne for his employers.

The following is an abstract of George Stuart Patterson's brief supplemented by oral argument. Insofar as possible, the language of the brief has been retained, although, of course, it has been necessary to very much condense the argument.

The scope of the obligation imposed on the carriers to sustain the reasonableness of a rate increase subsequent to January 1, 1910, is identical with that imposed on the shipper who attacks the reasonableness of a rate not increased subsequent to January 1, 1910. The needs of the carriers for additional revenue sustain the burden of proof in the case of a general advance of freight rates. These statements are substantiated by numerous findings of the commission.

To argue that proof of inadequate revenues does not constitute evidence as to the reasonableness of a general advance in rates is to contend that proof affecting the reasonableness of all rates does not affect the reasonableness of any particular rate. From this it would follow that there could never be a general advance in rates to meet a general deficiency of revenue because it would be manifestly a physical impossibility for the commission to consider each rate from the commercial and traffic standpoint prior to permitting the general advance to go into effect.

In the case of an increase in individual rates, the commission has repeatedly held that the burden of proof is sustained by showing (a) that the increase was made for the purpose of placing the increased rate on a proper relative basis with other rates and thus prevent discrimination; (b) that the rate as advanced is on the same basis as other rates on the same traffic established by the commission; (c) that the rate as advanced is reasonable, though made as a part of a rate adjustment and to prevent further reductions to other points; (d) that the cost of transportation has increased; (e) that the advanced rate is on the same basis as that charged by other carriers for similar services.

In considering the form of statement best calculated to show the essential facts regarding the adequacy or otherwise of net revenues, the carriers were guided by the opinion rendered in the 1910 case by Commissioner Prouty, where he said: "We are to determine whether the net return of these carriers on the value of their property devoted to public service will be sufficient without an advance in their rates." It has been urged that property investment as given by the carriers' books does not furnish an accurate reflection of the actual facts with respect to investment therein. Even supposing that this were true of this account in the case of any particular roads by reason of transactions in former periods, it is not true as regards comparison of this account from year to year or over a period in later years. Property investment account, as a matter of fact, has been absolutely comparable for all the years since 1909, and it will not be seriously contended that as between 1903 and subsequent years it does not represent real investment of money in the property.

During the past ten years, for the thirty-five railroad systems in this proceeding property investment has increased 46.04 per cent.; capital obligations have increased 49.22 per cent.; operating revenues have increased 63.54 per cent.; operating expenses have increased 74.80 per cent., and taxes have increased 111.43 per cent. During this same period, 1903-1913, there has been (a) a decline in the ratio of net operating income to property investment; (b) a decline in the ratio of net operating income (plus interest on funded debt) to total capital obligations; (c) a decline in the ratio of surplus to total capital obligations.

All of this shows a decided weakening in the position of the carriers as regards their return on investment, despite the growth in the size of the plant, volume and density of the business, and the facilities and improved methods of handling that business. Thus during the last ten years the carriers find themselves, after a period of great growth and expenditure of new capital, worse off than they were before this growth and expenditure, though they should be materially better off.

The importance of this showing for the period 1903 to 1913 is greatly increased by the fact that the tendencies which operated during that period to decrease the return on the investment are operating with even greater force in the last three years. The figures reflect an acceleration in the rate of decline in recent years. They show the lowest rate of return, and the lowest surplus in the last three years, and the year 1913 shows the lowest figure for any of these years. If it be remembered that these three years are the biggest three-year period in the carriers' history, and that 1913 was in itself the largest of the three, then the full significance of the showing becomes apparent.

The view has been suggested that the net revenues for 1913 were larger than for any of the last five years, except 1910, and, therefore, negative any inference that the carriers' revenues are inadequate or that they have reached a crisis in their affairs. In 1913 not only were the facilities the largest in the history of these carriers, but the use of them was the greatest, and practically to their full capacity. To justify the outlay required to provide the facilities, the net revenues resulting from such use should have exceeded those of any prior year—should have been sufficient not only to pay the charges on the additional property investment for a year, such as 1913, but to provide money to pay those charges during lean years, for instance, 1914, when the facilities are not fully used.

The year 1910 is that of the preceding five years wherein the then facilities of the carriers were fully used, and is, therefore, the year properly comparable with 1913. When a comparison of 1913 with 1910 shows that, despite the expenditure of over $659,000,000 on property and an increased use yielding $186,775,000 increased operating revenues, the net operating income decreased $16,311,000; then, that comparison, the carriers urge, does prove the inadequacy of their revenues and that the results so shown are not such as to fairly justify the expenditure of additional capital for the further provision of similar facilities.

It is an absolutely new thing in the history of American railroading for a year like 1913, or a period like 1910-1913, when traffic was the largest ever recorded for a similar period of time, to show the position of the owners of the property to be worse off than any previous years or periods. It is strong and conclusive evidence that some change has taken place in conditions, nor is it difficult to see what this change is, and what has brought it about. It will be disclosed by the collateral lines of inquiry; namely, increased cost of operation, and increased cost and difficulty of securing new capital. There has been a steady increase in transportation, maintenance of way and maintenance of equipment expenses, which are continuing in character, and the full effect of which is just beginning to be felt. Operating revenues are inadequate to keep pace with the expenses, and accordingly the money expended in procuring facilities has earned an inadequate return since 1903, and no return since 1910.

The effect of these things is that at a time when the business of the carriers is largest in volume, and at a time when their investments and capital obligations are the largest, and their

plant and equipment more complete and efficient, the carriers find themselves face to face with a declining net operating income. The result of this tendency toward diminishing net returns will be to check, if not altogether stop, the normal development of railroad facilities in this territory. In the last ten years, they have been forced to spend $200,000,000 a year, and an equal, if not a greater, amount will be necessary for the future if the railroads are to handle properly the business of the country.

The question is one not merely of railroad dividends, though that is a question of vital importance, but one of the interests of the general public in seeing that the railroads are maintained in a high state of efficiency, for, as Mr. Prouty said in the 1910 case: "If, therefore, we are to rely in the future as we have in the past upon private enterprise and private capital for our railway transportation, the return must be such as will induce the investment. It is, therefore, not only a matter of justice, but in the truest public interest that an adequate return should be allowed upon railway capital."

MR. BUTTERFIELD'S ARGUMENT

O. E. Butterfield, of the New York Central, followed Mr. Patterson, commenting first especially on the showing by railroads in central freight association territory. He also devoted particular attention to the propriety of the advance in the rates applicable by routes operating over the Great Lakes. He then discussed the apparent futility of other methods than a horizontal rate advance as means of immediate relief. Following is an abstract of his brief and oral argument in this connection.

In anticipation of a possible conclusion by the commission to the effect that present rates do not afford adequate revenue to the carriers, and having regard to the second question referred to by the commission in its inquiry under docket 5860 [investigation of spotting charges], it has been suggested that the revenue of the carriers under present tariffs and practices suffers important depletion from the performance by the carriers of certain services as incident to the transportation of freight without any charge in addition to the transportation rate, when in fact such services should more properly be held to be in addition to the transportation service covered by the published rate, and should be made the subject of additional charges.

In the industrial railways case the commission said that all services on a private siding beyond a point clear of the main tracks in placing a car for loading or unloading at a particular spot convenient to the shipper, are what may be called "voluntary services" in the sense that they are in addition to the main line haul and in excess of any obligation of service by the carrier at common law.

Following the decision, although there was no order made, the roads in official classification territory attempted in good faith to comply with the views of the commission in respect to industrial allowances. Tariffs were filed canceling allowances to 109 industrial railways, only 30 of which were specifically dealt with by the commission. Many persons affected by the cancellations felt themselves aggrieved, and sought through the medium of various state commissions to prevent the tariffs from going into effect to the full extent contemplated by the decision of this commission. The reform recommended, estimated to be worth $15,000,000 a year, has failed in its immediate purpose. The Interstate Commerce Commission assigned three days for further consideration of spotting cars, etc., and while the subjects have not been fully covered, some five volumes of testimony have been taken and sufficient attention has been given to them to make it apparent that if the suggested charges are to be made in respect to these matters they can only be made effective after meeting and overruling the opposition of almost the unanimous body of shippers and receivers of freight who now avail themselves of these services.

CHARACTER OF THE GENERAL ADVANCE

Mr. Butterfield then described the way in which the new tariffs showing advanced rates had been made up, showing that the differential had been maintained throughout the new tariffs with certain minor exceptions, and that the retaining of differentials and the establishment of a five cents minimum resulted in some instances in increased rates more than 5 per cent. higher than the former rate, and in other cases less than 5 per cent. higher. Mr. Butterfield maintained that there was not a single protest against this method of rate advances and that it was far in a way the most equitable and satisfactory method of making a general rate advance in official classification territory.

ANALYSIS OF PROTESTS AGAINST RATE ADVANCES

Mr. Butterfield pointed out that of the tremendous number of total commodities affected protests had been received by the commission against only 26 commodities.

The following is an abstract of Mr. Butterfield's detailed analysis of each one of these 26 protests:

Petroleum.—The rates on petroleum are 90 per cent. of the fifth class, and if the general advance is permitted they will be still on the same basis. The first witness appearing in behalf of the protestants was Mr. Pew, of Toledo, representing the Sun Oil Company. His principal complaint was that the proposed advances would operate to put him at a disadvantage as against the Standard Oil Company. On cross examination he admitted that his company had been prosperous and that there were some instances where the advance in oil would be less than 5 per cent. On redirect examination he said he had always considered the petroleum rates too high as compared with other products. F. W. Boltz, traffic manager of the National Petroleum Association (independents), filed an exhibit which he claimed showed that the proposed advances would discriminate against members of his association in favor of the Standard Oil, but on cross examination admitted that his exhibit did not disclose any such thing. When asked to state the reasons why he considered the present basis too high he made it perfectly clear that the present basis is too high relatively rather than too high per se, raising the question which obviously cannot with propriety be settled in a proceeding of this kind but should be made the subject of a separate inquiry if it is to be dealt with at all.

Ice.—The greater part of the testimony on the subject of ice was directed against the present service. The witness Green found fault with the car supply and movement; the witness Horner made it clear that he had no objection to the advance of 5 per cent. if it is uniform on all commodities; the witness Bishop said he would have no objection to a general advance if he could get the right kind of service; the witness Ferber said that the competition of the artificial ice producers prevented an increase in the price of ice to offset the increased freight rates, but later admitted that the price was f. o. b. the ice house and the consignee paid the freight charges. He said that the ice business could not stand an increase because of competition with artificial ice manufacturers, but the witness Drake said that these manufacturers would probably welcome an opportunity to increase their prices.

Tile, Brick and Clay.—The witnesses on this subject made it clear that their particular objection was to the present adjustment rather than to the proposed advances.

Boots and Shoes.—The National Shoe Wholesalers' Association appeared through counsel and deferred any protest they might have to make to be made the subject of a separate complaint.

Flour and Feed.—Mark Mennel appeared for practically all C. F. A. millers and said: "Our appearance today is to offer no objection to the horizontal advance of 5 per cent. on grain and grain products, but to ask for an equalization of the rates based more nearly on a 5 per cent. horizontal advance than is provided for by the advanced rate tariffs as published and suspended."

Peanuts.—The protest of these shippers was against the present adjustment, claiming that Virginia cleaners are at a disadvantage as against cleaners at competing points.

Coal and Coke.—Nearly three volumes of testimony was taken, with a result that New England dealers made it clear

that they are interested in the relation of rates rather than in the propriety of a horizontal advance; West Virginia dealers insist that the present relation of rates must be maintained regardless of whether there be a general advance or not; Canadian consignees object to an advance because they think that their rates already bear a disproportionate share of railroad earnings, and the Iowa consignees complain that they will not be able to distribute the additional burden to their consumers. The principal protest was made by the Pittsburgh Coal Company and amounted to a protest against the adjustment of coal rates as between the Pittsburgh district and competing producing territories, and this question was very fully covered by the commission in the Boileau case.

Linseed Oil.—A representative of the Corn Products Refining Company appeared to say formally that as long as there is uniform advance in all the commodities, this company had no objection.

Glucose and Starch.—A representative of the Clinton Sugar Refining Company testified at length that it is the present adjustment that offends him rather than the proposed advance, and the representative of Douglas & Company amplified the previous witness' statements and in addition claimed that there was discrimination at present in favor of the Corn Products Refining Company.

Wooden Barrels.—The one complainant against the advance in these rates said that the interests he represented had no objection to an advance on lumber and cooperage stock, but thought the present rates on fruit and vegetable packages are too high and that these rates should be readjusted before any general advance is made. A complaint against these rates had already been dismissed by the commission.

Sand and Gravel.—Rates on these commodities are affected by the five cents minimum rule and the witnesses criticized this rule.

Cement.—Michigan shippers and Lehigh Valley district shippers both protested. The Michigan shippers' representative, in an unsworn statement, claimed that some of the advances would be more than 5 per cent., but no testimony was offered to substantiate this point. The Lehigh Valley shippers' only complaint is against the existing adjustment.

Iron and Steel.—The bulk of the protest under this heading consisted of statements of counsel unsupported by testimony, in which it was said that the present rates are unreasonable and discriminatory for the various reasons which are under consideration in cases now pending before the commission.

Glass.—One day was assigned for listening to protests from shippers, but no testimony was offered.

Pulp and Paper.—Herman Mueller, a member of the Western Freight Traffic Association, claimed that the proposed advance would still further increase an already existing discrimination in favor of western dealers. A representative of the New England paper producers said that the relative adjustment was the sole matter of importance and some paper shippers were in favor of the general advance if the roads needed the money.

Plaster.—There was no objection to a horizontal increase, but the Grand Rapids Plaster Company objected to an advance which would give advantage to dealers west of official classification territory.

Lumber.—Representatives of lumber interests claimed that lumber already had too high a rate, but they did not object to advances applying to all commodities.

Packing House Products.—The principal objection was to the disparity in rates between live stock and packing house products.

Limestone.—The protestant admitted that any increase in rates on limestone will be paid by the producers of pig iron, and they are the only ones who could properly protest.

Condensed Milk.—The protestant said that the present adjustment is subject to criticism, and added that if the criticism referred to could be removed there would be no objection to the general advance.

Salt.—The only witness to protest said that his protest was based on the fact that if only rates in official classification territory were advanced, salt dealers in that territory would be put at a disadvantage with their competitors outside the territory. He said he would have no objection to an advance if it could be general all over the country.

Hides and Leather.—A. B. Caswell, of Milwaukee, entered a protest, which, however, concluded by saying that "if the commission determines that the carriers are entitled to an increase in revenue I would not be inclined to obstruct any further in the premises."

Truck Farm Products.—A number of witnesess testified that in their opinion an increase in the freight rate on truck products from Virginia would be more than truck farmers in this region could stand.

Fish.—A. W. Lyman appeared for the fishermen on the Maryland coast. The testimony disclosed, however, that they ship by express and that the rates they pay are not involved in this proceeding.

Hay and Grain.—George E. Pierce, of Buffalo, appeared to protest against the increase in rates on grain from Buffalo, claiming that Buffalo was wholly discriminated against in favor of Chicago and admitting that a general advance in rates would not change the situation.

Anthracite Coal.—A representative of the G. B. Markle Company entered a protest against the advance in anthracite coal rates from the Lehigh region to points west of Buffalo, but no testimony was offered in support of the protest.

MEETING OF DEMURRAGE MANAGERS

The twenty-fifth annual meeting of the American Association of Demurrage Officers was held in the Jefferson Hotel, St. Louis, April 21 and 22. There was an unusually large attendance of members and visitors. President E. E. Mote, of San Francisco, presided.

The executive committee recommended an increase in the demurrage rate, and the abrogation of the average rule. Both recommendations were approved by the association. Some members favored a graduated scale of charges after the free time, some advocated a rate of two dollars a day after the free time, and some wanted to increase the rate to three dollars, the same as is now charged in California. A few of the members further advocated a charge for detention of cars on Sundays and legal holidays after expiration of the free time. The average rule is held responsible for increased car detention, and for this reason its abrogation was recommended.

C. W. Crawford, assistant to the general agent of the American Railway Association, attended the convention and discussed the application of the demurrage rules to cars delivered to industries located on switching lines designated by the Interstate Commerce Commission as plant facilities.

D. I. Forsyth, of the Wabash Railroad, also attended one of the sessions of the meeting, and took part in the discussion of this subject. An organization is being effected at Buffalo to look after the application of the demurrage rules at South Buffalo, N. Y., these rules to take the place of the per diem rules which have governed heretofore. The demurrage managers practically agreed that the demurrage time in such cases should be computed from the placing of cars, either loaded or empty, on the interchange track of the plant facility, to the return thereto, the switching line being deemed an agency of the shipper or consignee.

Thomas O'Donnell, local representative of the Bureau for the Safe Transportation of Explosives, attended one session of the convention, and spoke in forcible language of the need of vigorous enforcement of the special storage rules governing the removal of explosives and inflammables from cars and freight houses. He reported finding many agents uninformed concerning the special storage rates on this class of shipments. He thought all railroads should join the demurrage and storage bureaus and that the latter should be provided with sufficent

inspection force to see that the rules were uniformly enforced. Several of the managers of bureaus which now have charge of storage rules explained the efforts being made by them to have the rules governing explosives and combustibles thoroughly understood by all their agents. They are handicapped by the fact that some of the railroads in their territories have withdrawn from the bureaus, and weakened their support.

Richmond, Va., was agreed upon as the place for the meeting in 1915, and the date of the meeting was left to the determination of the Executive Committee.

Officers were elected as follows: President, R. A. Taylor, manager of the Virginia and West Virginia Demurrage Bureau, Richmond, Va.; vice-president, M. W. Rotchford, manager of the Illinois and Iowa Demurrage Bureau, Peoria, Ill.; secretary-treasurer, A. G. Thomason, demurrage commissioner, Boston, Mass.

TRAIN ACCIDENTS IN MARCH[1]

Following is a list of the most notable train accidents that occurred on railways of the United States in the month of March, 1914:

Collisions

Date.	Road.	Place.	Kind of Accident.	Kind of train.	Kil'd.	Inj'd.
3.	Grand Trunk	Chicago.	rc.	P. & F.	2	2
16.	Louisville & N.	Snyder.	rc.	P. & F.	0	10
26.	St. Louis & S. F.	Maney.	bc.	P. & P.	0	40

Derailments

Date.	Road.	Place.	Cause of Derailm't.	Kind of train.	Kil'd.	Inj'd.
†14.	Chi. St. P. M. & O.	Mendota.	d. switch	P.	1	67
14.	Baltimore & Ohio.	Pittsburgh.	unx.	P.	0	2
19.	Cleve. C. C. & St. L.	Jonesboro.	unx.	P.	0	2
22.	Cleve. C. C. & St. L.	Indianapolis.	neg.	F.	2	2
27.	Georgia, F. & A.	Cuthbert.	unx.	P.	0	5
27.	Texas & Pacific.	Boyce, La.	d. track	P.	0	2
†28.	Cleve. C. C. & St. L.	W. Liberty.	neg.	P	1	16
29.	Missouri Pacific	Ottawa, Kan.	unx.	P.	0	22

The trains in collision on the Grand Trunk in Chicago on the 3rd were a westbound passenger and a switching freight moving in the same direction. In a dense fog, the passenger train ran into the freight. The conductor and the rear brakeman of the freight were killed and two passengers were slightly injured. The conductor in charge of the freight train had failed to check the register at Elsdon and proceeded on the main track on the time of the passenger train, which was overdue.

The train wrecked at Snyder, Ky., on the 16th was southbound passenger No. 31. The train ran into a string of 16 freight cars which had eluded control in a yard and had run to the main track. Four trainmen and six passengers were slightly injured. Cause of the accident appears to have been neglect to set the hand brakes on the freight cars when they were detached from a train.

The trains in collision near Maney, Okla., on the 26th were southbound passenger No. 5 and northbound local passenger train No. 716. The trains were at or near their appointed meeting station and the collision was not very violent. Thirty-seven passengers and 3 trainmen were injured. The cause of the collision was the disregard of a meeting order by the men in charge of train No. 5.

The train derailed at Mendota, Minn., on the night of the 14th was northbound passenger No. 4, and two coaches were overturned. One passenger was killed and 66 passengers and one employee were injured. The cause of the derailment was a loose switch rod which dropped from the vertical rod in the stand because of the absence of the cotter pin, which had come out.

[1]Abbreviations and marks used in Accident List:

rc, Rear collision——bc, Butting collision——xc, Other collisions——b, Broken——d, Defective——unf, Unforeseen obstruction——unx, Unexplained——derail, Open derailing switch——ms, Misplaced switch——acc. obst., Accidental obstruction——malice, Malicious obstruction of track, etc.——boiler, Explosion of locomotive on road——fire, Cars burned while running——P. or Pass., Passenger train——F. or Ft., Freight train (including empty engines, work trains, etc.)——Asterisk, Wreck wholly or partly destroyed by fire——Dagger, One or more passengers killed.

The train derailed at Pittsburgh, Pa., on the 14th was westbound passenger No. 19, and the engine was badly damaged. The engineman and fireman were injured.

The train derailed near Jonesboro, Ind., on the 19th was westbound passenger No. 33. The engine was overturned and the engineman and fireman were injured. The cause was reported as not determined.

The train derailed near Indianapolis, Ind., on the 22nd was an eastbound freight, and the engine and several cars were ditched. The fireman and a brakeman were killed and two other trainmen were injured. The cause of the derailment was disregard of signals.

The train derailed near Cuthbert, Ga., on the 27th was southbound passenger No. 3. Two passenger cars were overturned. Five passengers were injured.

The train derailed near Boyce, La., on the 27th was eastbound passenger No. 52. It occurred at 3:25 a. m. Two trainmen were slightly injured, but all of the passengers escaped with slight injuries. The derailment apparently was due to softening of a bank by high water.

The train derailed near West Liberty, Ohio, on the 28th was southbound passenger No. 3 and two passenger cars were overturned. The train was running about 40 miles an hour, and was thrown off the track by reason of a loose switch, left unlocked by a section foreman. The front part of the train passed over in safety. One passenger was killed and nine passengers and seven employees were injured.

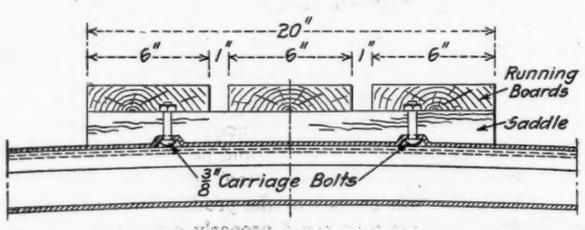
The train derailed near Ottawa, Kan., on the 29th was eastbound passenger No. 2. One of the two engines drawing the train was overturned and four cars were ditched. One engineman and 5 other trainmen and 16 passengers were injured. The cause of the derailment was not determined, but there is a theory that application of the brakes approaching a curve caused bunching of slack which forced a tender off the track.

Electric Car Accidents.—In a collision of electric cars near Gasport, N. Y., on the 19th of March, one passenger was killed and 17 were injured. The cause of the collision was the unexplained starting of the eastbound car, which was unattended. The conductor and motorman went into the station at Gasport to get orders, and while they were there the car was started; and before they got near it it had moved off at high speed. It appears that there were some passengers on the cars. Both cars were badly damaged at the colliding ends and every person in both cars was injured.

Canada.—Express train No. 9 of the Canadian Northern was derailed at Greenburg, Ont., on the night of March 21 and two passenger cars fell down a bank; but only two passengers were injured. The dining car fell down the bank, took fire and was burnt up.

CHRISTY STEEL FREIGHT CAR ROOF

A new style of steel roof which a study of its design would indicate to be of ample strength and waterproof in every detail, has recently been placed on the market by the American Car Roof Company, Marquette building, Chicago, Ill. It is made up

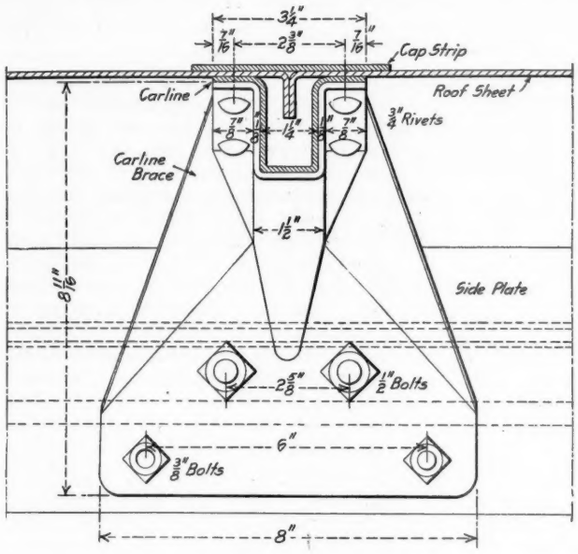


Section Through Carline Showing the Application of Running Board Saddle

entirely of pressed steel shapes, there being only five different shapes throughout the whole construction. The designers have so arranged their plans that this roof may be applied to any type

of car with but few modifications. The photograph shows its application to the steel frame box car. Being made up of comparatively small units, it will be an easy matter to renew any sheets or carlines that may become damaged.

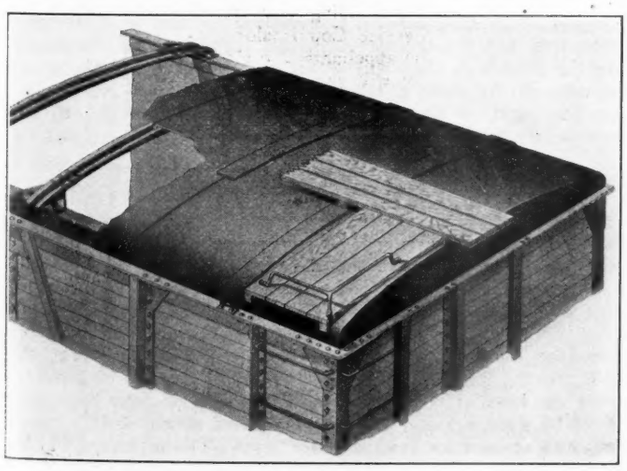
The five different pressed steel shapes that are used in this roof are the roof sheets, the carlines, the carline braces, the cap strips and a special Z-bar extending along the top of the car sheathing and the side plate. The roof sheets are rolled



Section Near Carline Brace

steel, extend over the full width of the car and are flanged from 30 in. No. 14 gage steel. They have a pitch of 6½ in. in 4 ft. 7⅞ in., and are formed to a smaller radius at the ends to fit over the sides of the car. The roof sheet flange is ¾ in. deep and rests in the carline, which is of a flanged U-section.

The carlines are spaced 27¼ in. between centers for a 40 ft. car and are shaped to conform to the pitch of the roof. The method of supporting them at the side plates is clearly shown in the illustrations. The carline braces are riveted to the carline flanges by four countersunk rivets and are bolted to the side

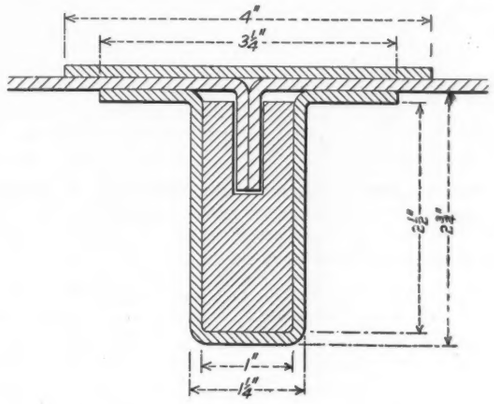


Christy Steel Roof Applied to a Steel Frame Box Car

plate by two ½ in. and two ⅜ in. carriage bolts. A cast iron block 2 in. long placed in the carlines at the center of the car, is cut out to receive the flanges of the roof sheets and serves to keep them in alinement.

The cap strips are 4 in. wide by ⅛ in. thick. They hold the roof sheets in place, these sheets not being held by any other means. These strips extend from one side of the car to the other, extending over the joints of the sheets as shown, and are attached to the side plates by two ½ in. carriage bolts. The strips are deflected at the top of the car to receive the bolts for the running board saddle. The special Z-bar is placed at the side plate to give the necessary stiffness to the side of the roof, and also performs a function in the waterproof features of the car.

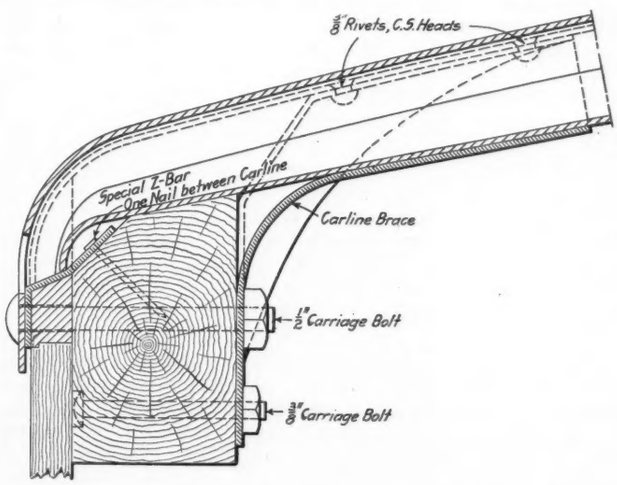
From this description it will be seen that there are absolutely no holes made in the roof sheets, so the only way for water to



Longitudinal Section at Center of Car

work its way through the roof into the car is around the edges of these sheets. This has been taken care of by having the sides of the sheets drain directly into the trough of the carline, which, on account of its pitch, will drain any water that may collect to the sides of the car and allow it to escape through a 1¼ in. by 1 in. hole in the cap strips provided for that purpose. The Z-bars at the sides of the car will prevent water working up by the side plate.

This roof eliminates the use of purlins or a ridge pole which



Section Through Carline at the Side Plate on a Wooden Frame Car

are claimed by the makers as not being necessary with this construction. The roof was invented by Henry A. Christy, the inventor of the Christy grain door.

RAILWAY CONSTRUCTION IN THE DOMINICAN REPUBLIC.—The Samana & Santiago, an English line running from the Dominican port of Sanchez on Samana Bay to the interior town of La Vega, is planning to extend its line from the latter point to Moca, about 15 miles distant. As Moca is the principal terminus of the Central Railway of Dominica it will be possible on the completion of the line to travel from Sanchez to Puerto Plata by rail.

General News Department

A general section meeting of the Canadian Society of Civil Engineers was held at Toronto, Ont., on April 23. Paul A. N. Seurot presented a paper on "Subaqueous Tunneling."

The Wisconsin division of the Chicago & North Western has been awarded the banner for making the best record in the Safety First campaign on that road during the past year.

The working time of mechanics employed in the Great Northern shops at Superior, Wis., has been reduced from nine to eight hours a day, and from six to five days a week. About 200 men are affected.

As heretofore announced, a meeting was held in Boston last Sunday, designed to promote a general federation of railroad employees. It was presided over by E. H. Morton. The attendance appears to have been small.

After May 1 the San Pedro, Los Angeles & Salt Lake will operate its own eating houses and hotels along its line, instead of leasing them to private individuals as in the past. The work will be under the supervision of the dining car department.

On the lines of the Philadelphia & Reading last Wednesday afternoon at 2 o'clock, all trains were brought to a stop for one minute; this as a mark of respect to the memory of the late president of the road, George F. Baer, whose funeral services were held at that hour.

Senator Tillman has introduced in Congress a resolution to investigate charges that the Southern Railway has discriminated unfairly against South Atlantic ports in the freight rate on coal shipped to those ports for the use of the navy. The bill has been favorably acted on by the Senate committee on naval affairs.

In the court at Newark, N. J., April 27, a gateman of the Delaware, Lackawanna & Western at East Orange, N. J., was brought to trial on a charge of manslaughter for having raised the gates at his crossing immediately after the passage of a westbound train and when an eastbound train was approaching. A man in an automobile drove on the crossing and was killed by the eastbound train.

The Carolina, Clinchfield & Ohio, which has conducted a Safety First campaign among its employees for about two years, has decided to solicit co-operation of the public. As a first step in this direction, the Central Safety Committee has issued a Safety First booklet containing certain facts which the public should know, and offering suggestions which it is felt will be the means of preventing injuries. The booklet contains statistics showing the number of trespassers killed and a list of "Don'ts" pointing out a number of ways in which carelessness frequently leads to injuries.

About 500 men employed on the new Kansas City Union passenger terminal have been on a strike for several days, because of the awarding of a contract for some of the work on the structure to a plumbing company that the men claim has been an enemy to the unions at other places. Officers of the Building Trades Council insist that this company agree to hire only union men on the station, and also agree to hire only union men in the future in other cities. Most of the men concerned are plumbers and steam fitters. The plumbing company has not yet begun its work, and officers of the terminal company state that it has contemplated hiring union men when the work does begin.

The Senate on Tuesday adopted without discussion the resolution of Mr. La Follette, of Wisconsin, asking the Interstate Commerce Commission to submit to the Senate copies of all signed or anonymous communications, newspaper clippings, and the like received by the commission or any individual commissioner from persons trying to influence the commission's decision in its investigation into railroad revenues and into the 5 per cent. rate increase proposed. Some time ago Mr. La Follette introduced in Congress a bill making it a penal offense to send to the commission communications of the sort his resolution refers to. The impression got abroad that he was aiming his bill at President Wilson, who was known to have conferred informally with members of the commission as to the application for authority to increase rates.

Of the two conductors of the Chesapeake & Ohio, who were arrested and tried in the United States court at Cincinnati for carrying passengers at less than the legal fare, one, Boyer, was acquitted by the jury and the other, Crist, is to be tried again in October, the jury, after being out four or five hours, having failed to agree upon his case. It appears that these conductors were detected by "spotters" who got letters from a man in Chicago introducing them to the conductor; and by the aid of these letters, they rode 285 miles by the payment to the conductor of three dollars in cash. No evidence was presented in the court to controvert that of the detectives, except the denials of the accused; but Boyer's wife and child were present in the court, and the verdict of the jury is supposed to have been due largely to a sympathetic feeling towards the woman and child.

New York Fare Law Vetoed

Governor Glynn, of New York, has vetoed a bill, which had been passed by the legislature, which would have required the New York, New Haven & Hartford and the New York Central to comply with an order of the State Public Service Commission, issued January 31, 1913, reducing passenger fares to and from New York City. The order of the commission had been declared illegal by the Appellate division of the Supreme Court (*Railway Age Gazette*, January 30, 1914, pages 211, 242, 249), on the grounds that the commission had not investigated all of the facts of the case and had not specifically declared the higher rates, adopted by the company, to be unreasonable; and the governor bases his veto on the fact that the question is now before the Court of Appeals on appeal. Legislation to forestall a decision by the court is declared wholly unjustifiable. Moreover, the Public Service Commission, which prescribed the lower rate, now advises the governor that he ought to veto the legislative act, reminding him that Governors Hughes, Dix and Sulzer had all refused to approve proposed legislation to fix rates for transportation, holding that questions of that kind were for the Public Service Commission to deal with. If the commuters, who are the appellants, are right in their contention, says the governor, they will secure full relief in the Court of Appeals. If the court should reject their case, they still would have the right, if any new evidence could be adduced, to go again before the Public Service Commission.

Grade Crossing Law in New Jersey

A law has been passed in New Jersey making an important addition to the requirements in regard to protection of wayfarers at crossings of railroads and highways. It was approved by the governor April 15. It applies to all crossings of railroads and roads or streets which have been improved by joint action of the state and a municipality, county or township, under the laws of the state relating to the improvement of public roads, and does not include roads not so improved. Under the laws of New Jersey certain highways have been improved by state aid, and the state makes an appropriation annually which is used for road improvements. The highways which are improved are those on which usually the travel is heavy.

With respect to these under the new act, the railroads must, within one year, provide protection in the form of safety gates, flagmen, electric bells, electric signs or other recognized systems of alarm or protection; and the fixtures and arrangements must have the approval of the Board of Public Utility Commissioners. The railroads are required to file with the board within ninety days following passage of the Act their plans for protection; and on approval of the plans, the roads must provide such protection within the time limited by the Act.

There is a provision in the Act that it shall not nullify the power of requiring protection at crossings at grade now vested in the Board of Public Utility Commissioners, by virtue of a previous enactment.

Special Train to Atlantic City Convention

The "Master Car Builders Special," via the Pennsylvania Lines, will leave Chicago, Union station, at 3 p. m., Monday, June 8, reaching Atlantic City about 2 o'clock the following afternoon. This train will be composed of Pullman, electric lighted, steel cars—library, smoking, sleeping and compartment observation cars, with Pennsylvania diners serving table d'hote dinner leaving Chicago, and a la carte breakfast and luncheon the following day.

The summer tourist fare from Chicago to Atlantic City will be $29.50 for the round trip, good to return within 30 days. Those who desire to go to New York after the convention, can purchase summer tourist tickets from Chicago to that point for $30, good to return within 30 days and deposit them for stop-over of 10 days at Philadelphia, purchasing round trip tickets for $2.50, Philadelphia to Atlantic City and return. The date of deposit counts as one day. Those desiring to return via Baltimore and Washington can do so, obtaining stop-over of 10 days at those points, Harrisburg and Pittsburgh, not exceeding the final limit of the ticket, by so specifying at the time of purchasing tickets and by depositing them at stop-over points immediately on arrival, date of deposit to count as one day.

Accommodations can now be reserved at the city ticket office of the Pennsylvania Lines, 242 South Clark street, Chicago, and will be held until June 1, by which time they must be claimed, or by letter to E. K. Bixby, district passenger agent, Pennsylvania Company, Chicago.

Summary of Revenue and Expenses of Steam Roads in February

The Bureau of Railway Economics' summary of revenues and expenses and comments thereon for February, 1914, are as follows:

Railways operating 225,539 miles of line are covered by this summary, or about ninety per cent. of all steam railway mileage in the United States. Their operating revenues for the month of February, 1914, amounted to $203,022,222. This amount includes revenues from freight and passenger traffic, from carrying mail and express, and from miscellaneous sources connected with rail operation. Compared with February, 1913, total operating revenues show a decrease of $23,330,211. Total operating revenues per mile of line averaged $900 in February, 1914, and $1,011 in February, 1913, a decrease of $111 or 11.0 per cent. There were decreases of 13.1 per cent. in freight revenue per mile, and of 5.4 per cent. in passenger revenue per mile.

Operating expenses, which include all the costs of maintaining track and equipment, operating trains, securing traffic, and of administration, amounted to $164,379,406. This was $4,031,222 less than for February, 1913. These operating expenses per mile of line averaged $729 in February, 1914, and $752 in February, 1913, a decrease of $23 per mile, or 3.1 per cent.

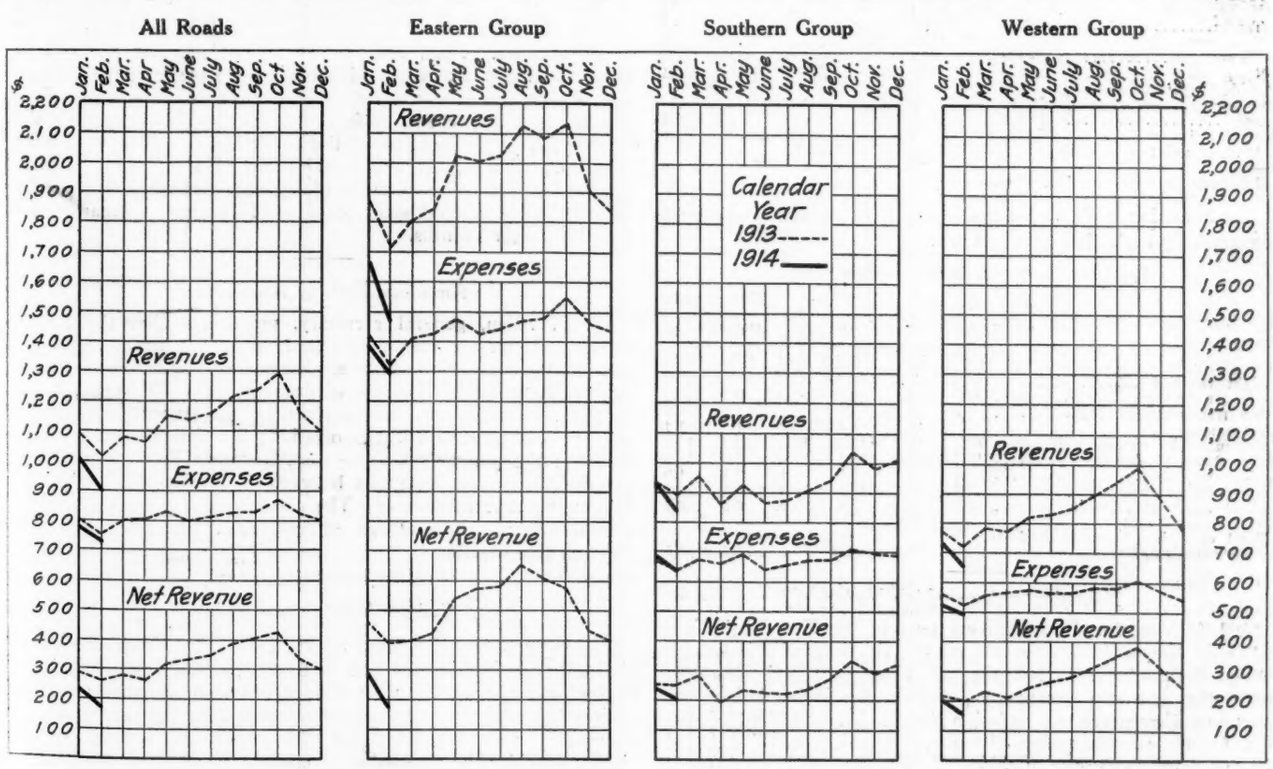
Net operating revenue, that is, total operating revenues less operating expenses, amounted to $38,642,816, which was $19,298,989 less than for February, 1913. Net operating revenue per mile of line averaged $171 in February, 1914, and $259 in February, 1913, a decrease of $88 per mile, or 33.8 per cent.

Taxes for the month of February amounted to $11,276,646, or $50 per mile, an increase of 10.3 per cent. over February, 1913.

Operating income, which is net revenue from rail and auxiliary operations, less taxes, averaged $119 per mile of line, and in February, 1913, $212, thus decreasing $93, or 44.0 per cent. Operating income for each mile of line for each day in February averaged $4.25, and for February, 1913, $7.58. Operating income is that proportion of their operating receipts which remains available to the railways for rentals, interest on bonds, appropriations for betterments, improvements, new construction, and for dividends.

The operating ratio for February, that is, the per cent. of total operating revenues absorbed in operating expenses, was 81.0 per cent., which is comparable with 74.4 per cent. in February, 1913, and 73.7 per cent. in February, 1912.

The railways of the Eastern district show a decrease in total operating revenues per mile of line as compared with February, 1913, of 14.2 per cent., the railways of the Southern district a decrease of 5.4 per cent., and the railways of the Western district a decrease of 9.4 per cent. Operating expenses per mile decreased 1.9 per cent. in the East, decreased 0.6 per cent. in the South, and decreased 5.3 per cent. in the West. Net operating revenue per mile decreased 55.6 per cent. in the East, decreased 17.8 per cent. in the South, and decreased 20.3 per cent. in the West. Taxes per mile show an increase of 5.4 per cent.



Monthly Revenues and Expenses per Mile of Line in 1914

in the East, an increase of 16.8 per cent. in the South, and an increase of 13.5 per cent. in the West. Operating income per mile decreased 72.2 per cent. in the East, decreased 23.1 per cent. in the South, and decreased 28.0 per cent. in the West.

Comparison of returns for eight months of the current fiscal year with those of the corresponding months of the previous fiscal year reveals a decrease in total operating revenues per mile of 2.5 per cent., an increase in operating expenses per mile of 3.0 per cent., and a decrease in net operating revenue per mile of 13.9 per cent. This net operating revenue per mile decreased 22.3 per cent. in the East as compared with the corresponding period of the previous year, decreased 1.2 per cent. in the South, and decreased 9.9 per cent. in the West.

When the returns for the two months of the calendar year 1914 are compared with those of the corresponding months of 1913, they show a decrease in total operating revenues per mile of 9.2 per cent., a decrease in operating expenses per mile of 3.2 per cent., and a decrease in net operating revenue per mile of 26.3 per cent. This net operating revenue per mile decreased 46.5 per cent. in the East as compared with the corresponding period of the previous year, decreased 12.3 per cent. in the South, and decreased 12.5 per cent. in the West.

The following table is introduced as being of interest in the matter of the application of the eastern carriers for higher freight rates. It is cumulated from monthly returns of revenues and expenses made by the railways to the Interstate Commerce Commission. There are included the returns of the 49 railway systems covered by the compilations of the Bureau of Railway Economics, with the exception of certain small roads that have annual operating revenue of less than $100,000, and are therefore excused by the commission from the requirement of filing monthly returns:

Revenues and Expenses of Railways in the Eastern District for Eight Months Ending February 28, 1914, as Compared with Eight Months Ending February 28, 1913

	Total amount.		Amount per mile of line.	Increase per mile 1914 over 1913.	
Account.	1914.	1913.	1914.	Amount.	Per cent.
Total operating revenues.	$910,346,537	$931,508,361	$15,322	d$447	d2.8
Freight	636,148,641	666,125,255	10,707	d569	d5.0
Passenger	205,245,414	198,267,622	3,454	98	2.9
Other transportation	57,598,087	56,319,096	969	16	1.7
Non-transportation	11,354,395	10,796,388	191	8	4.6
Total operating expenses.	683,364.514	645,404,193	11,502	576	5.3
Maint. of way and struct.	120,811,583	116,374,037	2,033	63	3.2
Maint. of equipment	174,062,832	161,229,178	2,930	200	7.3
Traffic	16,993,611	15,629,017	286	21	8.1
Transportation	349,737,102	332,334,741	5,886	261	4.6
General	21,759,386	19,837,220	366	30	9.1
Net operating revenue	226,982,023	286,104,168	3,820	d1,023	d21.1
Outside operations — net revenue	d1,970,689	755,576	d33	...	...
Taxes	37,946,436	35,438,965	639	39	6.5
Operating income	187,064,898	251,420,779	3,148	d1,108	d26.0
Average mileage represented, 1914, 59,414; 1913, 59,073.					

d Denotes decrease or deficit.

The following table shows the per cent. of operating revenues consumed by each class of expenses:

Per Cent. of Total Operating Revenues

	February United States		Fiscal year ending June 30		Eight months ending February 28	
	1914	1913	1913	1912	1914	1913
Freight revenue	69.4	71.1	69.8	68.7	68.8	69.9
Passenger revenue	21.6	20.3	22.2	23.2	23.1	22.2
Other transportation	7.8	7.5	6.9	7.1	7.0	6.8
Non-transportation	1.2	1.1	1.1	1.0	1.1	1.1
Maintenance of way and structures	12.6	11.8	13.3	12.7	13.3	12.7
Maintenance of equipment	19.7	18.0	16.4	15.9	17.3	16.0
Traffic expenses	2.4	2.2	2.0	2.1	2.1	1.9
Transportation expenses	43.1	39.8	35.2	35.9	36.1	34.6
General expenses	3.2	2.6	2.4	2.5	2.5	2.3
Total operating expenses (excluding outside operations and taxes)	81.0	74.4	69.3	69.1	71.3	67.5

Valuation of the Lehigh Valley

W. J. Wilgus, formerly chief engineer of the New York Central, who has made a valuation of the property of the Lehigh Valley Railroad, says that the work has engaged 100 men 14 months, and has cost about $126,000. Testifying before the Interstate Commerce Commission in its investigation of the rates for the transportation of anthracite coal, Mr. Wilgus said that to reproduce the Lehigh Valley Railroad would cost $324,478,300.

Dynamite Plot in Maine

Percy R. Todd, president of the Bangor & Aroostook, received information recently that there was on foot a well developed plot to dynamite the bridges of the road, the attempt to be made probably when the water in the river should have been raised to flood level by the spring freshets. This information was received in the shape of a letter from six prominent manufacturers and business men; and this letter, with the signers' names attached, is printed in the Bangor *Commercial* of April 25. The writers of the letter say that prominent citizens have been consulted and that they are satisfied concerning the gravity of the situation. Mr. Todd, in replying to their letter, and commending their public stand in the matter, advises that all possible precautions are being taken, and that the directors of the road have authorized a reward and all proper expenditures. He says that not only are the bridges to be watched, but that probably all persons will be forbidden to walk on the tracks or the right of way.

Ever since the strike of January, 1913, when every engineman and fireman left the service, and when it took three months to restore the full train service, the Bangor & Aroostook has been annoyed by lawless acts of various kinds. The strike has never been declared off. In the past winter, over 30 locomotives had to be taken off from passenger trains when on the road, all within a few weeks, because of hot bearings due to the presence of ground glass, steel filings and other foreign substances in the grease cups. After much trouble and expense, three Italians were arrested for this vandalism and have been held for trial before the grand jury; and on the occasion of the appearance of one of these men before the magistrate, the man's lawyers were accompanied by two of the striking enginemen and by another member of the locomotive enginemen's brotherhood.

High-Speed Track-Laying

The last spike on the Grand Trunk Pacific was driven at Nechako Crossing. The laying the last mile of steel on this latest transcontinental railroad was witnessed by 1,500 people. Tuesday, April 8, at 11 o'clock was appointed for the laying the last mile. The first gang to reach the center post was to receive all honors. It was 12:30, however, before the crews were ready. The track laying crew from the east won out, and the point they stopped at was immediately east of the center post, so as to give the motion picture machines a chance to obtain the best record. The approximate half mile was laid in 38 minutes. Final rails were cut and the last one laid in place at 1:32 p. m. Each of the general superintendents drove a spike, the division superintendents, each one, the foremen of the track laying crews each one, and the chief engineer the final spike. The foremen of the track laying crews were each presented with a gold watch and chain as a memento of their hard work and in recognition of the fact that they had jointly laid 145 miles of steel since the first of January, a great record for the winter months.

American Railway Association

W. F. Allen, general secretary, announces that the spring meeting of this association will be held at The Biltmore, Madison and Vanderbilt avenues, Forty-third and Forty-fourth streets, New York City, on Wednesday, May 20, beginning at 11 a. m. Reports will be presented by the Executive Committee; the Committee on Transportation; the Committee an Maintenance; the Joint Committee on Automatic Train Stops, and the committees on Relations between Railroads, on Explosives and on Electrical Working. The election of a president, a first vice-president and members of various committees will take place at this meeting.

Freight Agents' Association

The twenty-seventh annual convention of the American Association of Freight Agents was held at Houston, Tex., last week, beginning on April 21, with 175 members in attendance. The convention adopted a resolution recommended by the executive committee, recommending that the American Railway Association consider the establishment of a national school for freight agents.

American Society of Mechanical Engineers

At the meeting of the American Society of Mechanical Engineers at New York, on May 12, a paper will be presented by H. de B. Parsons, of the Metropolitan Sewerage Commission, entitled Main Drainage and Sewage Disposal Plans for the City of New York.

Central Railway Club

At the regular meeting of the Central Railway Club at the Hotel Statler, Buffalo, N. Y., on May 8, W. F. Goltra, president of the W. F. Goltra Tie Company, will present a paper entitled "Treating Railroad Ties and Timbers as Practiced in North America."

MEETINGS AND CONVENTIONS

The following list gives names of secretaries, dates of next or regular meetings, and places of meeting.

AIR BRAKE ASSOCIATION.—F. M. Nellis, 53 State St., Boston, Mass. Next convention, May 5-8, Hotel Pontchartrain, Detroit, Mich.

AMERICAN ASSOCIATION OF DEMURRAGE OFFICERS.—A. G. Thomason, Boston, Mass.

AMERICAN ASSOCIATION OF GENERAL PASSENGER AND TICKET AGENTS.—W. C. Hope, 143 Liberty St. New York.

AMERICAN ASSOCIATION OF FREIGHT AGENTS.—R. O. Wells, I. C. R. R., East St. Louis, Ill.

AMERICAN ASSOCIATION OF RAILROAD SUPERINTENDENTS.—E. H. Harman, St. Louis, Mo.; 3d Thursday and Friday in May.

AMERICAN ELECTRIC RAILWAY ASSOCIATION.—E. B. Burritt, 29 W. 39th St., New York.

AMERICAN ELECTRIC RAILWAY MANUFACTURERS' ASSOC.—H. G. McConnaughy, 165 Broadway, New York. Meetings with Am. Elec. Ry. Assoc.

AMERICAN RAILWAY ASSOCIATION.—W. F. Allen, 75 Church St., New York. Next meeting, May 20, Hotel Biltmore, 43d St., New York.

AMERICAN RAILWAY BRIDGE AND BUILDING ASSOCIATION.—C. A. Lichty, C. & N. W., Chicago. Next convention, October 20-22, 1914, Los Angeles, Cal.

AMERICAN RAILWAY ENGINEERING ASSOCIATION.—E. H. Fritch, 900 S. Michigan Ave., Chicago. Next convention, March 16-18, 1915.

AMERICAN RAILWAY MASTER MECHANICS' ASSOCIATION.—J. W. Taylor, Karpen Building, Chicago. June 15-17, Atlantic City, N. J.

AMERICAN RAILWAY TOOL FOREMEN'S ASSOCIATION.—A. R. Davis, Central of Georgia, Macon, Ga. Next convention, July 20-22, Hotel Sherman, Chicago.

AMERICAN SOCIETY FOR TESTING MATERIALS.—Prof. E. Marburg, University of Pennsylvania, Philadelphia, Pa. Next annual meeting, June 30 to July 4, Hotel Traymore, Atlantic City, N. J.

AMERICAN SOCIETY OF CIVIL ENGINEERS.—Chas. W. Hunt, 220 West 57th St., New York; 1st and 3d Wed., except June, July and August, New York. Annual convention, June 2-5, Baltimore, Md.

AMERICAN SOCIETY OF ENGINEERING CONTRACTORS.—J. R. Wemlinger, 11 Broadway, New York; 2d Thursday of each month, at 2 P. M., 11 Broadway, New York.

AMERICAN SOCIETY OF MECHANICAL ENGINEERS.—Calvin W. Rice, 29 W. 39th St., New York. June 16-19, St. Paul-Minneapolis, Minn.

AMERICAN WOOD PRESERVERS' ASSOCIATION.—F. J. Angier, B. & O., Baltimore, Md. Next convention, January 19-21, 1915, Chicago.

ASSOCIATION OF AMERICAN RAILWAY ACCOUNTING OFFICERS.—C. G. Phillips, Highland Park, Ill. Annual meeting, June 24, Minneapolis, Minn.

ASSOCIATION OF RAILWAY CLAIM AGENTS.—C. W. Egan, B. & O., Baltimore, Md. Next convention, May, St. Paul, Minn.

ASSOCIATION OF RAILWAY ELECTRICAL ENGINEERS.—Jos. A. Andreucetti, C. & N. W. Ry., Chicago. Semi-annual meeting, June 12, Hotel Denis, Atlantic City, N. J. Annual convention, October 19-23, Chicago.

ASSOCIATION OF RAILWAY TELEGRAPH SUPERINTENDENTS.—P. W. Drew, 112 West Adams St., Chicago. Next convention, May 19-22, New Orleans, La.

ASSOCIATION OF TRANSPORTATION AND CAR ACCOUNTING OFFICERS.—G. P. Conard, 75 Church St., New York. Annual meeting, Hotel Chalfont, Atlantic City, N. J., June 18-19.

ASSOCIATION OF WATER LINE ACCOUNTING OFFICERS.—W. R. Evans, Chamber of Commerce, Buffalo, N. Y.

BRIDGE AND BUILDING SUPPLY MEN'S ASSOCIATION.—L. D. Mitchell, Detroit Graphite Co., Detroit, Mich. Meeting with American Railway Bridge and Building Association.

CANADIAN RAILWAY CLUB.—James Powell, Grand Trunk Ry., Montreal, Que.; 2d Tuesday in month, except June, July and August, Windsor Hotel, Montreal.

CANADIAN SOCIETY OF CIVIL ENGINEERS.—Clement H. McLeod, 176 Mansfield St., Montreal, Que.; 1st Thursday, October, November, December, February, March and April, Montreal.

CAR FOREMEN'S ASSOCIATION OF CHICAGO.—Aaron Kline, 841 Lawler Ave., Chicago; 2d Monday in month, except July and August, Lytton Bldg., Chicago.

CENTRAL RAILWAY CLUB.—H. D. Vought, 95 Liberty St., New York; 2d Fri. in Jan., May, Sept. and Nov. and 2d Thurs. in March, Hotel Statler, Buffalo, N. Y.

CIVIL ENGINEERS' SOCIETY OF ST. PAUL.—Edw. J. Dugan, P. O. Box 654, St. Paul, Minn.; 2d Monday, except June, July, August and September, Old State Capitol Bldg., St. Paul.

ENGINEERS' SOCIETY OF PENNSYLVANIA.—Edw. R. Dasher, Box 75, Harrisburg, Pa.; 1st Friday after 10th of each month, except July and August, 31 So. Front St., Harrisburg, Pa.

ENGINEERS' SOCIETY OF WESTERN PENNSYLVANIA.—Elmer K. Hiles, Oliver Bldg., Pittsburgh; 1st and 3d Tuesday, Pittsburgh, Pa.

FREIGHT CLAIM ASSOCIATION.—Warren P. Taylor, Richmond, Va. Next convention, May 13, Hotel Galvez, Galveston, Tex.

GENERAL SUPERINTENDENTS' ASSOCIATION OF CHICAGO.—A. M. Hunter, 605 Grand Central Station, Chicago; Wed. preceding 3d Thurs., Transportation Bldg., Chicago.

INTERNATIONAL RAILWAY CONGRESS.—Executive Committee, 11, rue de Louvain, Brussels, Belgium. Convention, 1915, Berlin.

INTERNATIONAL RAILWAY FUEL ASSOCIATION.—C. G. Hall, 922 McCormick Bldg., Chicago. Annual convention, May 18-21, Hotel La Salle, Chicago.

INTERNATIONAL RAILWAY GENERAL FOREMEN'S ASSOCIATION.—Wm. Hall, 829 West Broadway, Winona, Minn. Next convention, July 14-17, Hotel Sherman, Chicago.

INTERNATIONAL RAILROAD MASTER BLACKSMITHS' ASSOCIATION.—A. L. Woodworth, Lima, Ohio. Next convention, third Tuesday in August.

MAINTENANCE OF WAY MASTER PAINTERS' ASSOCIATION OF THE UNITED STATES AND CANADA.—T. I. Goodwin, C. R. I. & P., Eldon, Mo. Next convention, November 17-19, 1914, Detroit, Mich.

MASTER BOILER MAKERS' ASSOCIATION.—Harry D. Vought, 95 Liberty St., New York. Next annual meeting, May 25-28, Hotel Walton, Philadelphia.

MASTER CAR BUILDERS' ASSOCIATION.—J. W. Taylor, Karpen Building, Chicago. June 10-12, Atlantic City, N. J.

MASTER CAR & LOCOMOTIVE PAINTERS' ASSOC. OF U. S. AND CANADA.—A. P. Dane, B. & M., Reading, Mass. Next convention, September 8-11, Nashville, Tenn.

NATIONAL RAILWAY APPLIANCES ASSOCIATION.—Bruce V. Crandall, 537 So. Dearborn St., Chicago. Next convention, March 15 to 19, 1915, Chicago.

NEW ENGLAND RAILROAD CLUB.—W. E. Cade, Jr., 683 Atlantic Ave., Boston, Mass.; 2d Tuesday in month, except June, July, Aug. and Sept., Boston.

NEW YORK RAILROAD CLUB.—H. D. Vought, 95 Liberty St., New York; 3d Friday in month, except June, July and August, New York.

NIAGARA FRONTIER CAR MEN'S ASSOCIATION.—E. Frankenberger, 623 Brisbane Bldg., Buffalo, N. Y. Meetings monthly.

PEORIA ASSOCIATION OF RAILROAD OFFICERS.—M. W. Rotchford, Union Station, Peoria, Ill.; 2d Thursday in month, Jefferson Hotel, Peoria.

RAILROAD CLUB OF KANSAS CITY.—C. Manlove, 1008 Walnut St., Kansas City, Mo.; 3d Friday in month, Kansas City.

RAILROAD MASTER TINNERS, COPPERSMITHS & PIPEFITTERS' ASSOCIATION.—U. G. Thompson, C. & E. I., Danville, Ill. Annual meeting, May 19-22, Marquette Hotel, St. Louis, Mo.

RAILWAY BUSINESS ASSOCIATION.—Frank W. Noxon, 30 Church St., New York.

RAILWAY CLUB OF PITTSBURGH.—J. B. Anderson, Penna. R. R., Pittsburgh, Pa.; 4th Friday in month, except June, July and August, Pittsburgh.

RAILWAY DEVELOPMENT ASSOCIATION.—W. Nicholson, Kansas City Southern, Kansas City, Mo.

RAILWAY ELECTRICAL SUPPLY MANUFACTURERS' ASSOC.—J. Scribner, 1021 Monadnock Block, Chicago. Meetings with Assoc. Ry. Elec. Engrs.

RAILWAY FIRE PROTECTION ASSOCIATION.—C. B. Edwards, Mobile & Ohio, Mobile, Ala. Annual meeting, 1st Tuesday in October.

RAILWAY GARDENING ASSOCIATION.—J. S. Butterfield, Lee's Summit, Mo.

RAILWAY SIGNAL ASSOCIATION.—C. C. Rosenberg, Bethlehem, Pa. New York, May 27 and 28. Annual meeting, Bluff Point, N. Y., September 22-24.

RAILWAY STOREKEEPERS' ASSOCIATION.—J. P. Murphy, Box C, Collinwood, Ohio. Next convention, May 18-20, Hotel Raleigh, Washington, D. C.

RAILWAY SUPPLY MANUFACTURERS' ASSOCIATION.—J. D. Conway, 2136 Oliver Bldg., Pittsburgh, Pa. Meetings with M. C. B. and M. M. Associations. Atlantic City, June 10 to 17.

RAILWAY TELEGRAPH & TELEPHONE APPLIANCE ASSOCIATION.—G. A. Nelson, 50 Church St., New York. Meetings with Assoc. of Ry. Teleg. Supts.

RICHMOND RAILROAD CLUB.—F. O. Robinson, C. & O., Richmond, Va.; 2d Monday in month, except June, July and August.

ROADMASTERS' AND MAINTENANCE OF WAY ASSOCIATION.—L. C. Ryan, C. & N. W., Sterling, Ill. Next convention, September 8-10, 1914, Chicago.

ST. LOUIS RAILWAY CLUB.—B. W. Frauenthal, Union Station, St. Louis, Mo.; 2d Friday in month, except June, July and Aug., St. Louis.

SALT LAKE CITY TRANSPORTATION CLUB.—R. E. Rowland, Hotel Utah Bldg., Salt Lake City, Utah; 1st Saturday of each month, Salt Lake City.

SIGNAL APPLIANCE ASSOCIATION.—F. W. Edmunds, 3868 Park Ave., New York. Meeting with annual convention Railway Signal Association.

SOCIETY OF RAILWAY FINANCIAL OFFICERS.—Carl Nyquist, La Salle St. Station, Chicago.

SOUTHERN ASSOCIATION OF CAR SERVICE OFFICERS.—E. W. Sandwich, A. & W. P. Ry., Atlanta, Ga. Next meeting, July 16, Chattanooga, Tenn.

SOUTHERN & SOUTHWESTERN RAILWAY CLUB.—A. J. Merrill, Grant Bldg., Atlanta, Ga.; 3d Thurs., Jan., March, May, July, Sept., Nov., 10 A. M., Candler Bldg., Atlanta.

TOLEDO TRANSPORTATION CLUB.—J. S. Marks, Agent, Interstate Despatch, Toledo, Ohio; 1st Saturday in month, Boody House, Toledo.

TRACK SUPPLY ASSOCIATION.—W. C. Kidd, Ramapo Iron Works, Hillsburn, N. Y. Meetings with Roadmasters' and Maintenance of Way Association.

TRAFFIC CLUB OF CHICAGO.—W. H. Wharton, La Salle Hotel, Chicago.

TRAFFIC CLUB OF NEW YORK.—C. A. Swope, 291 Broadway, New York; last Tuesday in month, except June, July and August, Waldorf-Astoria, New York.

TRAFFIC CLUB OF PITTSBURGH.—D. L. Wells, Erie R. R., Pittsburgh, Pa.; meetings bimonthly, Pittsburgh. Annual meeting, 2d Monday in June.

TRAFFIC CLUB OF ST. LOUIS.—A. F. Versen, Mercantile Library Building, St. Louis, Mo. Annual meeting in November. Noonday meetings October to May.

TRAIN DESPATCHERS' ASSOCIATION OF AMERICA.—J. F. Mackie, 7122 Stewart Ave., Chicago. Next convention, June 16, Jacksonville, Fla.

TRANSPORTATION CLUB OF BUFFALO.—J. M. Sells, Buffalo; first Saturday after first Wednesday.

TRANSPORTATION CLUB OF DETROIT.—W. R. Hurley, Supt.'s office, L. S. & M. S., Detroit, Mich.; meetings monthly, Normandie Hotel, Detroit

TRAVELING ENGINEERS' ASSOCIATION.—W. O. Thompson, N. Y. C. & H. R., East Buffalo, N. Y. Next meeting, August, Chicago.

UTAH SOCIETY OF ENGINEERS.—Fred D. Ulmer, Oregon Short Line, Salt Lake City, Utah; 3d Friday of each month, except July and August.

WESTERN CANADA RAILWAY CLUB.—W. H. Rosevear, P. O. Box 1707, Winnipeg, Man.; 2d Monday, except June, July and August, Winnipeg.

WESTERN RAILWAY CLUB.—J. W. Taylor, 1112 Karpen Building, Chicago; 3d Tuesday of each month, except June, July and August, Karper Building, Chicago.

WESTERN SOCIETY OF ENGINEERS.—J. H. Warder, 1735 Monadnock Block, Chicago; regular meeting 1st Monday in month, except January, July and August, Chicago. Extra meetings, except in July and August, generally on other Monday evenings.

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF FEBRUARY, 1914

Name of road.	Average mileage operated during period.	Operating revenues			Operating expenses						Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or decr.) comp. with last year.
					Maintenance										
		Freight.	Passenger.	Total. inc. misc.	Way and structures.	Of equipment.	Traffic.	Transportation.	General.	Total.					
Alabama & Vicksburg	142	$89,470	$34,453	$135,522	$21,734	$33,433	$3,895	$53,251	$5,863	$118,178	$17,343	—$379	$7,250	$9,713	—$4,605
Alabama Great Southern	309	292,581	89,630	414,234	52,169	106,609	13,223	152,142	13,509	337,653	76,581	—744	15,493	60,344	—36,560
Ann Arbor	291	88,462	29,544	129,517	10,195	21,695	5,347	64,933	7,437	109,609	19,908	70	13,770	6,209	—7,092
Arizona & New Mexico	108	64,969	8,336	75,420	6,593	10,465	803	13,946	2,739	34,548	40,871	.....	3,000	37,871	—8,299
Arizona Eastern	366	181,535	32,041	223,872	46,410	21,362	1,858	59,651	10,800	140,083	83,789	130	12,259	71,659	—27,632
Atchison, Topeka & Santa Fe	8,339	4,277,589	1,834,333	6,643,560	760,888	1,219,373	177,154	2,108,860	178,659	4,504,936	2,138,624	.....	397,174	1,741,449	—567,805
Atlanta & West Point	92	52,365	35,290	98,499	10,953	21,626	5,394	32,477	4,430	74,881	23,617	134	7,124	16,627	—4,656
Atlanta, Birmingham & Atlantic	645	201,191	45,615	272,740	41,729	48,068	14,339	115,460	12,164	231,763	40,977	.....	14,336	26,640	3,478
Atlantic & St. Lawrence	166	132,726	20,857	165,161	14,795	22,856	4,280	79,551	4,787	126,269	38,891	.....	10,157	28,754	37,356
Atlantic City	166	42,746	42,315	91,596	34,873	20,198	1,314	73,823	634	130,843	—39,246	—1,488	15,000	—55,734	—27,737
Atlantic Coast Line	4,654	2,108,968	886,316	3,235,247	409,032	458,140	58,204	1,104,180	103,477	2,133,035	1,102,212	—456	132,000	969,755	—250,659
Baltimore & Ohio	4,456	5,004,820	914,442	6,336,317	767,930	1,224,475	150,977	3,094,673	185,922	5,423,980	912,336	—86,260	282,828	543,246	—743,097
Baltimore & Ohio Chicago Terminal	77	.....	464	100,227	11,917	22,120	1,043	57,161	4,847	97,090	3,137	652	20,168	—16,378	—15,998
Bangor & Aroostook	630	200,740	34,971	248,868	51,650	38,730	2,909	119,046	9,309	221,646	27,222	25	29,589	17,607	35,844
Belt Ry. Company of Chicago	21	.....	.....	226,107	10,739	22,356	565	99,497	5,975	139,134	86,973	.....	9,513	77,459	14,099
Bessemer & Lake Erie	203	227,838	22,376	259,026	55,052	205,809	8,252	131,740	11,934	412,789	—153,762	.....	18,000	—171,762	—163,290
Bingham & Garfield	26	114,075	3,932	118,830	8,171	19,174	650	23,195	2,679	53,871	64,959	.....	2,650	62,308	14,234
Birmingham Southern	44	45,566	1,060	79,510	18,727	15,759	477	32,303	5,040	72,307	7,202	.....	1,614	5,588	—31,345
Boston & Maine	2,251	1,847,950	915,865	3,011,490	391,792	555,424	36,407	1,772,258	115,435	2,871,317	140,173	10,457	176,354	—25,723	—245,009
Buffalo & Susquehanna	1,954	33,160	4,929	40,206	6,376	9,863	361	17,885	2,157	36,645	3,561	—6	1,600	1,954	23,011
Buffalo, Rochester & Pittsburgh	584	649,751	73,459	744,606	73,600	171,963	10,567	317,493	19,368	592,993	151,613	—374	18,000	133,238	—84,438
Butte, Anaconda & Pacific	90	103,449	8,304	122,842	9,607	17,281	548	41,529	4,948	73,915	48,926	.....	2,500	46,426	41,304
Canadian Pacific (Lines in Maine)	233	102,699	21,653	134,571	28,271	22,239	6,263	67,742	5,106	129,624	4,946	.....	11,000	—6,053	—31,663
Carolina, Clinchfield & Ohio	248	154,472	11,294	169,579	10,347	24,121	6,513	35,325	9,859	86,167	83,412	.....	14,250	69,162	—28,796
Central New England	303	203,353	29,956	247,268	37,019	31,604	1,244	120,173	5,511	195,553	51,714	—680	11,500	39,534	—58,225
Central of Georgia	1,924	783,865	265,490	1,150,109	180,460	210,884	34,866	406,872	39,981	873,064	277,044	5,092	52,252	229,884	51,616
Central R. R. of New Jersey	676	1,409,835	340,796	1,850,942	215,122	357,926	21,839	698,443	47,758	1,341,090	509,851	—27,944	113,922	367,985	—418,028
Central Vermont	411	170,745	54,932	245,921	35,013	68,596	8,815	165,569	6,773	283,768	—37,847	—523	15,500	—53,870	—59,979
Charleston & Western Carolina	340	123,484	26,335	157,415	30,172	24,611	3,178	65,518	4,126	127,607	29,807	.....	5,000	24,807	—14,430
Chesapeake & Ohio	2,346	1,985,723	365,105	2,479,826	257,846	649,025	55,367	956,079	78,538	1,996,857	482,968	2,723	420,671	365,021	—330,309
Chicago & Alton	1,025	557,664	250,318	899,209	123,442	289,085	44,284	455,936	47,411	960,160	—60,950	—2,221	55,200	—118,372	—111,149
Chicago & Eastern Illinois	1,282	917,886	204,923	1,227,028	111,854	361,225	26,267	506,129	37,389	1,042,866	184,162	—1,823	56,900	125,438	—141,785
Chicago & Erie	269	318,017	38,106	398,137	64,723	123,102	20,696	243,019	17,037	468,579	—70,442	638	16,029	—85,832	—54,480
Chicago & Northwestern	8,094	3,743,227	1,382,156	5,663,014	567,049	880,099	118,958	2,594,961	155,759	4,316,829	1,346,185	—1,680	353,000	991,505	—241,913
Chicago, Burlington & Quincy	9,128	4,354,132	1,324,530	6,422,590	543,727	1,174,410	122,904	2,443,282	195,588	4,479,914	1,942,676	—18,765	317,386	1,606,524	—394,956
Chicago Great Western	1,496	719,150	199,106	1,001,081	89,104	174,517	47,097	458,720	35,912	805,353	195,727	—462	38,650	156,615	—75,020
Chicago, Indiana & Southern	358	283,607	18,676	311,318	38,456	108,749	11,172	129,121	11,785	299,284	12,034	—212	18,645	—6,823	—49,321
Chicago, Indianapolis & Louisville	616	308,472	101,487	457,253	74,704	90,913	15,742	212,798	18,152	412,312	44,941	.....	24,367	20,574	—49,568
Chicago Junction	11	.....	.....	144,195	13,698	16,807	1,138	91,648	5,497	128,791	15,404	3,577	3,280	15,701	—11,273
Chicago, Milwaukee & St. Paul	9,690	4,421,216	1,088,226	6,144,422	502,939	1,050,053	143,710	2,988,340	144,952	4,829,997	1,314,425	—9,568	330,321	974,335	117,052
Chicago, Peoria & St. Louis	255	96,574	17,379	121,223	21,016	32,635	6,270	67,779	5,330	133,032	—11,809	.....	4,800	—16,609	—8,016
Chicago, Rock Island & Gulf	476	135,506	46,028	198,945	24,591	20,993	8,973	95,489	8,003	158,051	40,894	—495	8,814	31,584	—46,143
Chicago, Rock Island & Pacific	7,845	3,026,956	1,159,943	4,519,543	520,624	699,259	145,849	2,264,736	164,138	3,794,607	724,935	—9,200	264,207	451,527	—188,183
Chicago, St. Paul, Minneapolis & Omaha	1,746	846,215	347,238	1,272,693	109,030	172,239	25,709	565,961	38,474	911,415	361,277	—444	77,783	283,049	31,290
Chicago, Terre Haute & Southeastern	361	165,104	12,812	181,255	14,379	50,625	3,263	63,953	8,817	141,039	40,216	276	11,500	28,993	5,267
Cincinnati, Hamilton & Dayton	1,014	465,842	100,038	632,951	142,223	151,097	18,297	381,298	21,673	714,589	—81,637	.....	36,586	—118,224	—195,399
Cincinnati, New Orleans & Texas Pacific	337	682,405	177,117	900,117	84,251	219,993	25,757	276,393	23,225	629,621	270,496	—2,380	31,000	237,116	—96,263
Cincinnati Northern	245	74,554	13,256	92,102	35,141	28,313	2,350	49,742	3,719	119,268	27,168	.....	6,000	—33,165	31,190
Cleveland, Cincinnati, Chic. & St. Louis	2,360	1,620,212	566,829	2,413,076	461,498	696,167	64,401	1,244,111	72,602	2,538,780	—125,703	—5,148	124,500	—255,351	—719,925
Colorado & Southern	1,126	403,202	84,856	531,157	59,362	83,633	10,622	234,446	22,043	410,109	121,047	—481	31,042	89,523	—76,261
Colorado Midland	337	81,715	15,437	105,571	20,839	35,283	6,805	57,878	8,056	126,863	—21,292	—619	10,000	31,912	—18,801
Cumberland Valley	162	202,133	46,569	262,452	35,388	42,410	4,482	104,537	7,647	194,466	67,985	139	5,910	62,215	—11,929
Delaware & Hudson	880	1,201,363	155,964	1,425,991	150,386	260,368	22,633	691,974	63,448	1,188,811	237,180	—79	55,950	181,151	—520,439
Delaware, Lackawanna & Western	959	1,787,546	534,171	2,512,256	202,173	504,036	58,969	961,273	70,436	1,796,889	715,366	12,927	185,000	543,293	—432,627
Denver & Rio Grande	2,574	1,184,711	257,224	1,515,815	144,677	321,961	37,500	544,134	52,096	1,100,370	415,444	—6,658	85,000	323,785	—149,168
Denver & Salt Lake	255	51,229	8,769	64,629	18,268	14,592	1,157	29,983	3,583	67,585	—2,956	.....	4,000	—6,956	—6,136
Detroit & Mackinac	411	62,602	19,133	87,829	9,163	12,739	2,205	38,840	2,381	65,331	22,497	—89	9,118	13,289	—1,895
Detroit & Toledo Shore	78	122,111	.....	126,379	10,801	13,731	1,633	39,062	2,818	68,047	58,332	.....	4,703	53,628	—13,682
Detroit, Grand Haven & Milwaukee	190	103,000	35,000	163,284	10,303	35,928	5,726	122,760	4,756	179,474	—16,190	27	3,600	—19,762	—7,853
Detroit, Toledo & Ironton	441	43,948	7,411	60,051	83,439	44,592	2,372	131,578	10,507	272,491	—212,439	.....	5,700	—218,139	—149,509

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF FEBRUARY, 1914—CONTINUED

Name of road.	Average mileage operated during period.	Operating revenues: Freight.	Passenger.	Total. inc. misc.	Operating expenses: Maintenance: Way and structures.	Maintenance: Of equipment.	Traffic.	Transportation.	General.	Total.	Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or decr.) comp. with last year.
Duluth & Iron Range	291	$89,185	$19,885	$117,971	$25,479	$49,162	$1,094	$76,765	$9,393	$161,894	—$43,923	—$7,489	$5,841	—$57,254	$4,846
Duluth, Missabe & Northern	363	70,491	26,058	101,302	67,131	84,232	1,871	75,905	12,588	241,729	—140,427	—1,201	5,268	—146,896	—38,477
Duluth, South Shore & Atlantic	627	162,536	61,755	237,738	32,975	32,427	9,208	114,148	9,267	198,027	39,710	—1,028	19,600	19,082	2,431
Duluth, Winnipeg & Pacific	181	117,839	22,119	142,437	8,046	52,094	2,459	65,123	5,747	133,470	8,967	.....	7,121	1,845	—44,279
Elgin, Joliet & Eastern	804	699,320	3	751,081	95,216	203,406	4,922	263,470	17,929	584,944	166,137	.....	44,725	121,412	—203,016
Erie R. R.	1,987	2,528,178	569,381	3,433,244	311,786	802,360	103,020	1,553,180	125,822	2,896,169	537,075	—73,608	162,600	300,866	—701,381
Florence & Cripple Creek	86	87,694	10,119	99,716	5,505	9,182	1,765	33,764	4,475	54,693	45,022	.....	9,588	35,433	—1,312
Florida East Coast	695	220,571	320,905	618,564	58,709	64,268	11,257	164,686	13,612	312,534	306,029	—3,151	20,000	282,878	15,943
Fort Worth & Denver	454	235,383	90,751	347,037	31,105	46,167	6,967	170,473	15,783	270,497	76,539	—322	13,300	62,916	—13,758
Galveston, Harrisburg & San Antonio	1,338	621,492	251,225	931,145	143,922	147,311	31,843	398,279	35,575	756,931	174,213	—1,724	40,297	132,191	55,513
Georgia R. R. Lessee Organization	307	168,547	63,723	255,231	16,756	42,697	10,830	108,860	8,721	187,867	67,363	.....	2,533	64,830	9,613
Georgia Southern & Florida	395	117,103	60,641	203,776	26,502	39,982	8,022	88,735	11,163	174,406	29,369	—235	11,112	18,021	—29,631
Grand Rapids & Indiana	575	237,957	92,978	357,763	57,534	74,055	10,341	202,334	15,932	360,198	—2,434	—414	24,221	—27,069	—25,155
Grand Trunk Western	347	328,000	124,000	484,065	42,165	103,618	17,979	260,745	17,492	442,001	42,063	3,023	31,500	7,540	—54,120
Great Northern	7,803	2,594,769	812,013	3,780,347	449,781	783,205	104,788	1,624,226	118,463	3,080,464	699,882	—11,465	327,550	360,866	—725,078
Gulf & Ship Island	307	100,764	25,751	135,520	21,431	30,680	2,898	43,913	8,566	107,492	28,028	—23	7,468	20,535	—39,686
Gulf, Colorado & Santa Fe	1,595	676,045	184,535	919,259	143,362	167,212	25,159	400,128	38,583	774,246	145,013	.....	41,316	103,696	—52,956
Hocking Valley	35	290,319	58,317	372,149	28,030	121,285	8,418	167,921	13,779	339,434	32,715	.....	38,400	—5,684	—105,057
Houston & Texas Central	789	331,614	109,926	478,211	89,743	75,913	13,906	237,767	18,468	435,800	42,410	—357	27,612	14,441	—31,836
Houston East & West Texas	190	83,146	28,035	117,672	18,563	11,984	1,786	55,433	4,201	91,969	25,702	.....	4,920	20,782	—3,613
Illinois Central	4,762	3,295,339	1,004,094	4,928,860	576,139	1,054,689	103,905	2,001,665	150,513	3,886,913	1,041,947	—994	300,617	740,334	—246,950
Indiana Harbor Belt	104	.....	.....	233,287	29,873	27,781	2,647	132,382	7,979	200,664	32,622	224	6,000	26,847	—34,348
International & Great Northern	1,159	478,527	152,411	685,870	146,698	111,804	26,140	366,751	32,646	684,041	1,828	—2,374	35,000	—35,546	—128,041
Kanawha & Michigan	176	162,105	25,139	192,482	16,395	52,694	2,660	69,514	6,895	148,160	44,322	—15	10,996	33,310	—11,067
Kansas City Southern	827	646,806	113,342	837,559	79,033	110,899	28,778	317,058	36,727	572,497	265,062	.....	47,628	217,433	—15,718
Lake Erie & Western	905	304,896	50,081	377,875	58,517	89,564	10,345	190,498	11,499	360,424	17,450	.....	20,000	—2,549	—63,811
Lake Shore & Michigan Southern	1,852	2,329,197	804,013	3,599,962	431,037	905,411	71,327	1,546,514	95,573	3,049,864	550,098	—7,307	197,500	345,291	—852,457
Lehigh & Hudson River Ry. Co	96	112,250	3,170	121,600	11,304	19,514	1,296	58,665	3,499	94,280	27,320	.....	4,000	23,320	—19,801
Lehigh & New England R. R.	285	115,432	1,116	125,829	16,752	22,691	1,540	42,935	3,757	87,677	38,152	.....	3,217	34,935	—14,644
Lehigh Valley	1,440	1,938,037	264,265	2,312,385	288,744	465,736	75,834	1,082,534	80,458	1,993,307	319,077	—45,114	132,000	141,963	—596,171
Long Island	398	198,528	414,621	685,978	109,947	110,892	9,962	414,949	24,684	670,436	15,541	—1,451	64,080	—49,989	—10,687
Louisiana & Arkansas	278	112,966	17,785	134,599	25,477	18,861	2,348	35,633	5,888	88,208	46,391	.....	6,650	39,741	—4,226
Louisiana Ry. & Navigation	350	106,764	20,863	137,865	22,453	16,878	6,166	62,050	9,748	117,297	20,568	.....	7,250	13,318	212
Louisiana Western	207	118,354	60,161	187,113	17,393	43,299	7,174	60,429	6,780	135,077	52,035	—2,546	9,535	39,953	2,943
Louisville & Nashville	4,923	3,163,435	968,261	4,410,840	666,739	956,415	103,348	1,616,535	106,541	3,449,580	961,259	5,050	210,938	755,371	—246,278
Louisville, Henderson & St. Louis	199	66,804	25,773	100,482	18,925	12,746	4,570	40,318	2,936	79,496	20,985	81	3,600	19,466	1,946
Maine Central	1,206	581,624	181,016	813,525	90,047	129,847	9,429	378,459	29,146	636,930	176,594	—5,581	52,129	118,883	—44,442
Michigan Central	1,799	1,547,193	517,312	2,287,187	268,853	423,536	62,107	1,244,417	57,126	2,056,042	231,145	—7,815	132,000	91,330	—355,532
Midland Valley	373	68,458	34,875	110,393	26,981	24,467	2,379	45,783	6,059	105,672	4,721	—55	6,543	—1,877	—2,508
Minneapolis & St. Louis	1,585	572,227	122,837	727,767	76,799	108,616	16,726	339,098	19,854	561,095	166,671	.....	34,567	132,104	—70,020
Minneapolis, St. Paul & Sault Ste. Marie	3,979	1,377,892	344,936	1,840,211	192,767	328,137	43,681	804,347	51,432	1,420,366	419,844	—1,351	68,771	349,721	—210,189
Missouri & North Arkansas	365	58,708	28,761	93,617	25,839	24,448	3,413	48,366	6,183	108,251	—14,634	.....	5,500	—20,134	—19,582
Missouri, Kansas & Texas	3,816	1,522,350	613,949	2,321,960	306,432	306,090	59,166	1,043,722	108,226	1,823,638	498,321	—7,894	123,330	367,097	—109,211
Missouri, Oklahoma & Gulf	332	73,541	17,215	93,970	28,541	17,230	4,820	49,826	12,790	113,209	—19,239	212	6,461	25,488	—15,089
Missouri Pacific	3,919	1,272,432	308,596	1,746,677	228,122	299,994	50,824	884,086	65,516	1,528,545	218,132	—2,229	101,373	114,529	—105,961
Mobile & Ohio	1,122	776,874	107,351	939,587	123,109	216,106	43,796	399,860	34,151	817,024	122,563	1,203	33,321	88,038	—106,122
Monongahela R. R.	66	95,765	2,143	100,070	8,357	5,608	462	23,891	2,133	40,453	59,617	.....	2,350	57,267	—27,365
Monongahela Connecting	6	.....	.....	70,382	5,337	10,962	300	37,269	2,545	56,414	13,967	.....	2,281	11,685	—48
Morgan's Louisiana & Texas	404	227,640	101,781	354,549	52,711	50,872	11,511	155,416	12,133	282,644	71,904	—1,326	24,860	45,717	54,729
Nashville, Chattanooga & St. Louis	1,231	713,333	220,259	1,010,692	157,321	208,000	43,663	411,864	42,092	862,943	147,748	82	29,400	118,431	—88,257
Nevada Northern	165	115,154	10,260	128,290	13,642	18,528	568	31,323	4,622	68,683	59,606	.....	7,200	52,406	—5,059
New Orleans & Northeastern	195	241,703	53,924	324,470	33,617	65,671	10,070	117,274	12,877	239,512	84,957	—1,155	14,300	69,502	—2,082
New Orleans Great Northern	282	100,555	28,306	141,010	19,374	13,426	2,357	42,588	8,484	86,251	54,759	—39	3,326	51,393	—15,153
New Orleans, Mobile & Chicago	402	129,050	25,459	163,206	21,826	24,956	3,576	58,906	8,538	117,804	45,401	—123	6,081	39,196	—24,512
New Orleans, Texas & Mexico	285	91,020	16,636	114,827	45,654	11,607	3,403	48,698	9,009	118,372	—3,545	.....	3,100	—6,646	—34,562
New York Central & Hudson River	3,756	4,413,480	2,076,564	7,389,503	1,056,979	1,708,172	154,456	3,441,391	233,876	6,594,875	794,628	—37,609	489,699	267,239	—881,926
New York, Chicago & St. Louis	566	772,849	74,025	879,778	104,486	152,263	48,419	489,137	18,788	813,094	66,683	—3,268	35,000	28,415	—126,114
New York, New Haven & Hartford	2,007	2,210,107	1,816,066	4,500,198	513,468	837,653	29,604	2,191,541	149,549	3,721,817	778,381	10,103	290,000	498,484	—290,851
New York, Ontario & Western	565	470,194	64,446	558,016	76,979	111,196	9,254	284,339	16,559	498,328	59,688	—7,002	19,000	33,685	—112,064
New York, Philadelphia & Norfolk	112	194,128	28,952	239,693	24,891	56,532	3,667	134,704	13,601	233,396	6,296	.....	8,700	—2,403	—41,573
New York, Susquehanna & Western	140	138,588	36,978	197,778	17,266	30,241	1,532	100,624	10,408	160,073	37,704	—5,217	13,970	18,517	—16,617

REVENUES AND EXPENSES OF RAILWAYS

MONTH OF FEBRUARY, 1914—CONTINUED

Name of road.	Average mileage operated during period.	Operating revenues			Operating expenses						Net operating revenue (or deficit).	Outside operations, net.	Taxes.	Operating income (or loss).	Increase (or decr.) comp. with last year.
					Maintenance										
		Freight.	Passenger,	Total. inc. misc.	Way and structures.	Of equipment.	Traffic.	Transportation.	General.	Total.					
Norfolk & Western	2,036	$2,575,608	$309,842	$3,017,253	$281,853	$751,255	$59,442	$1,058,720	$75,385	$2,226,656	$790,596	—$1,369	$140,000	$649,227	—$329,630
Norfolk Southern	860	222,325	60,787	309,269	46,002	39,949	6,048	118,126	17,660	227,787	81,482	405	10,796	71,090	—33,734
Northern Central	472	604,413	159,754	832,741	150,749	223,819	13,613	521,345	27,777	937,306	104,564	—25	36,718	—141,309	—162,442
Northern Pacific	6,310	3,025,804	903,290	4,221,760	445,493	607,651	95,355	1,699,350	96,754	2,945,104	1,276,655	—1,497	477,436	797,721	—255,863
Northwestern Pacific	400	74,509	113,020	208,341	44,338	39,189	3,535	101,997	11,144	200,205	8,136	.....	15,100	—6,963	—25,744
Oregon Shore Line	2,119	998,811	284,182	1,404,574	158,317	215,866	29,510	428,462	55,165	887,323	517,251	—5,035	125,502	386,712	—218,741
Oregon-Washington R. R. & Navigation	1,914	767,591	283,000	1,156,557	122,067	156,562	39,181	439,442	57,987	815,241	314,316	—3,580	109,645	228,091	32,430
Pecos & Northern	481	125,593	28,376	164,376	13,845	32,751	2,946	59,191	6,615	115,350	49,025	.....	7,082	41,943	12,659
Pennsylvania *Co.*	1,749	2,617,530	631,743	3,636,830	549,072	886,714	78,402	1,693,217	127,734	3,335,140	301,690	—12,066	262,918	26,705	—24,582
Pennsylvania *R. R.*	4,043	8,530,832	2,534,247	12,043,179	1,877,551	2,754,120	157,882	5,325,515	367,595	10,482,666	1,560,512	—168,121	596,067	796,323	—1,341,725
Pere Marquette	2,324	786,226	214,515	1,103,371	162,323	244,742	34,600	589,239	39,790	1,069,695	33,675	—2,003	56,316	—24,644	—220,286
Philadelphia & Reading	1,020	2,579,676	463,099	3,218,780	276,401	676,250	39,381	1,316,600	60,971	2,369,605	849,175	7,049	103,130	753,095	—654,202
Philadelphia, Baltimore & Washington	717	630,011	607,200	1,405,104	244,858	300,489	22,837	744,669	43,213	1,356,067	49,037	.....	52,996	—3,958	—113,993
Pittsburgh & Lake Erie	224	1,076,471	116,520	1,233,396	129,695	313,250	14,680	363,944	31,129	852,700	380,696	—414	53,500	326,782	—289,065
Pittsburgh, Cincinnati, Chic. & St. Louis	1,472	1,954,552	549,501	2,821,825	427,569	650,759	63,409	1,292,317	73,367	2,512,423	309,401	—891	145,484	163,025	—343,763
Pittsburgh, Shawmut & Northern	282	172,847	8,420	183,292	5,520	49,031	1,372	70,004	5,003	130,932	52,360	.....	1,824	50,535	10,441
Port Reading	21	98,648	.....	101,437	10,476	251	38	43,782	117	54,666	46,770	3,068	19,000	30,839	—46,284
Richmond, Fredericksburg & Potomac	87	110,229	104,317	241,437	21,107	25,081	4,381	92,611	7,702	150,884	90,552	—498	8,000	82,054	—18,970
Rutland	468	134,223	66,094	233,559	28,879	56,326	7,125	122,821	5,291	220,445	13,114	—57	17,470	—4,413	—14,695
St. Joseph & Grand Island	318	81,290	21,041	113,109	16,376	16,816	4,866	52,916	5,444	96,420	16,689	.....	6,752	9,936	16,464
St. Louis & San Francisco	4,741	2,136,552	723,106	3,086,106	502,589	542,353	76,932	1,204,498	101,449	2,427,824	658,282	.....	116,405	541,876	—472,460
St. Louis, Brownsville & Mexico	517	143,984	73,485	236,266	53,316	24,889	4,157	99,174	11,472	193,009	43,276	.....	7,000	36,256	14,023
St. Louis, Iron Mountain & Southern	3,365	1,821,096	466,496	2,496,398	292,368	344,571	53,541	851,185	74,104	1,615,771	880,626	2,857	127,713	750,055	—158,764
St. Louis Merchants' Bridge Terminal Ry.	9	.....	294	142,960	22,123	2,654	795	88,005	5,544	119,123	23,836	.....	6,250	17,586	8,490
St. Louis, San Francisco & Texas Ry	243	85,374	24,124	117,120	33,474	18,958	2,195	60,870	5,970	121,469	—4,348	.....	1,476	—5,824	—27,753
St. Louis Southwestern	943	505,946	99,249	639,318	60,928	108,489	29,118	214,400	29,605	442,541	196,776	—1,353	31,877	163,545	—157,187
St. Louis Southwestern Ry. Co. of Texas	810	234,428	76,552	336,455	85,998	86,102	13,134	165,210	21,015	371,460	—35,005	—178	15,500	—50,683	—22,607
San Antonio & Aransas Pass	724	241,321	89,651	349,975	108,152	68,334	6,301	164,326	11,947	359,063	—9,088	.....	18,000	—27,008	—39,895
San Pedro, Los Angeles & Salt Lake	1,133	495,671	195,201	744,746	81,965	127,098	28,874	254,621	19,011	511,570	233,175	—3,643	47,051	182,477	—37,078
Seaboard Air Line	3,081	1,473,189	473,923	2,153,707	258,078	286,349	70,235	794,768	57,896	1,467,418	686,288	1,084	82,000	605,373	—21,763
Southern Kansas Ry. Co. of Texas	179	71,901	12,803	88,454	6,453	19,056	1,645	29,359	3,883	60,398	28,055	.....	3,676	24,379	977
Southern Pacific	6,440	3,794,187	2,012,451	6,270,529	923,237	1,011,371	154,629	2,029,149	226,477	4,344,864	1,925,665	41,452	414,045	1,553,072	—491,501
Southern Ry.	7,036	3,469,498	1,310,246	5,217,031	737,344	916,367	180,221	2,073,473	179,080	4,086,487	1,130,543	—3,196	229,056	898,289	—272,911
Southern Ry. Co. in Mississippi	280	63,832	31,325	104,076	26,087	9,527	2,545	46,591	4,069	88,820	15,255	.....	7,797	7,458	33,837
Spokane International	163	44,674	10,089	57,500	6,308	4,506	1,837	1,292	3,632	37,578	19,922	.....	3,081	16,841	—14,495
Spokane, Portland & Seattle Ry	556	187,389	95,732	307,346	49,465	37,254	7,069	92,706	12,940	199,436	107,910	—2,187	53,400	52,323	—12,529
Tennessee Central	293	86,732	27,141	122,485	18,770	14,601	5,582	47,519	7,035	93,509	28,975	.....	4,245	24,730	—3,899
Terminal R. R. Association of St. Louis	33	.....	178	224,713	27,861	8,279	943	100,025	5,659	142,768	81,944	8,032	27,100	62,876	5,661
Texas & New Orleans	458	214,645	93,811	329,928	65,615	76,425	8,686	138,549	13,529	302,805	27,122	—288	18,206	8,627	—12,914
Texas & Pacific	1,884	961,314	321,816	1,391,383	132,878	231,635	34,941	696,845	44,523	1,140,825	250,558	—509	62,000	188,048	45,975
Toledo & Ohio Central	446	280,720	42,990	339,076	62,496	79,682	6,178	166,964	10,893	326,214	12,861	—388	20,351	—7,878	—65,504
Toledo, Peoria & Western	247	59,793	31,855	96,746	15,544	24,401	2,050	45,319	3,479	90,795	5,950	.....	6,800	—849	—12,712
Toledo, St. Louis & Western	450	283,820	20,054	326,964	30,353	48,858	15,786	153,177	9,123	257,299	69,664	.....	17,500	52,164	—55,691
Trinity & Brazos Valley	462	138,695	35,320	183,919	55,934	19,309	9,150	98,548	12,209	195,152	—11,232	.....	4,900	—16,132	356
Ulster & Delaware	128	32,501	11,201	46,655	8,157	10,944	1,026	28,977	3,776	52,882	—6,227	18	3,500	—9,708	—15,668
Union R. R. of Pennsylvania	31	.....	.....	187,686	21,369	93,571	100	136,168	2,800	254,010	—66,323	5,108	7,000	—68,214	—41,556
Union R. R. of Baltimore	9	78,611	20,150	101,202	33,964	.....	.....	4,784	2,601	41,349	59,852	.....	5,930	53,922	—76,122
Union Pacific	3,615	2,193,095	624,971	3,226,801	236,430	546,656	96,116	1,065,667	118,778	2,063,650	1,163,151	—18,555	192,255	952,341	—325,866
Vandalia	910	547,942	173,176	806,882	75,770	190,052	24,002	374,033	22,065	685,924	120,958	.....	32,409	88,549	—41,236
Vicksburg, Shreveport & Pacific	171	87,243	38,085	140,389	23,604	30,970	3,556	53,978	5,236	117,347	23,042	—144	7,200	15,698	455
Virginia & Southwestern	240	121,691	11,177	137,365	21,113	40,881	2,121	43,625	4,292	112,033	25,331	.....	6,948	18,383	—22,596
Virginian Railway	503	331,165	22,359	366,232	50,794	80,211	5,521	111,553	11,422	259,503	106,729	5,286	112,015	89,365	—143,585
Wabash R. R.	2,514	1,400,663	420,905	2,036,700	239,465	438,767	79,313	1,051,314	65,437	1,874,299	162,400	—6,834	99,191	56,374	—217,376
Washington Southern	35	31,328	52,024	107,495	11,535	15,707	2,551	44,668	3,196	77,659	29,836	—212	3,500	26,123	—2,480
West Jersey & Seashore	355	105,443	183,208	311,373	73,400	73,691	10,152	203,201	13,213	373,659	—62,285	—6,141	26,954	—95,381	49,211
Western Maryland	661	491,590	50,193	567,909	227,231	263,422	20,339	330,375	26,703	868,072	—300,163	.....	26,000	—326,163	—422,461
Western Pacific	942	317,559	61,016	390,226	85,112	77,750	24,464	178,016	22,513	387,856	2,370	—3,820	34,779	—36,229	—82,511
Western Railway of Alabama	133	71,445	39,482	120,204	21,258	24,128	6,406	35,154	5,548	92,496	27,708	64	5,007	22,764	—9,010
Wheeling & Lake Erie	459	427,785	39,019	501,672	35,076	80,168	10,296	215,805	19,352	360,699	140,973	—96	28,688	112,187	30,204
Yazoo & Mississippi Valley	1,371	687,968	226,287	984,543	113,802	122,814	15,248	384,658	28,579	665,103	319,440	460	53,500	266,400	192,925

Traffic News

The Chicago Brass Manufacturers' Association has adopted resolutions favoring the increase of freight rates on the eastern roads.

The Chicago & North Western announces that, beginning May 4, a parlor car will be run daily between Chicago and Des Moines.

The Western Scrap Iron & Steel Association, at a meeting in Chicago on April 22, passed a resolution approving the proposed five per cent. advance in freight rates.

P. S. Eustis, passenger traffic manager of the Chicago, Burlington & Quincy, addressed the Traffic Club of Kansas City on April 22, on "Transportation of the United States Mail."

The passenger department of the Philadelphia & Reading, in making contracts for special trains for parties, will, henceforth, refuse to furnish any car or facilities for selling or distributing intoxicating liquors.

The Western Classification Committee will hold a hearing at its rooms in Chicago, on May 7, on proposed changes in classification No. 52, affecting the specifications for pails, firkins, kits and tubs made of wood, indurated fiber, iron or steel, also changes in the ratings on fiber.

Resolutions in favor of increased freight rates have been sent to the Interstate Commerce Commission by the Chicago Typographical Union, and other allied printing trades unions, following a joint conference of the printing trades organizations in Chicago last week.

Refugees from Mexico, who have been in Texas several weeks, are being moved to a point in New Mexico, farther from the international boundary; and the Southern Pacific has agreed, at the request of the Secretary of State, to carry these and other refugees at half rates. Congress has appropriated $500,000 to bring Americans home from Mexico.

Records kept by the Baltimore & Ohio Southwestern and the Cincinnati, Hamilton & Dayton show that during 1913 these roads handled a total of 1,263,555 freight cars through the Cincinnati terminal. The loaded and empty cars delivered to and received from connecting lines numbered 538,946, showing that a large proportion of the business was local to the rails of the two companies in the Cincinnati district.

The Railway Commission of Canada held a hearing at Ottawa, on April 21, to consider protests made by the Canadian Lumbermen's Association and the Montreal Lumbermen's Association against a proposed advance in the rate on lumber from Ottawa to Montreal, from 5 to 6 cents per 100 lb. The railways took the position that the rates had been reduced to meet water competition, and that it has now been decided to disregard that competition.

After having considered 23,000 claims, and paid out approximately $350,000 as refunds for amounts collected by the Chesapeake & Ohio above the legal rates in West Virginia, while the suit contesting the constitutionality of the state two-cent fare law was in the courts, the commission appointed to redeem the excess fare coupons has made preparations to wind up its work. It is expected that the total payments will reach $400,000 before the final claims are paid.

Traveling freight investigators have been placed in the service of the Baltimore & Ohio Southwestern and the Cincinnati, Hamilton & Dayton roads to assist local agents to keep correct records of shipments on hand and to deliver, so far as possible, those that are received without identifying marks. The investigators devote their efforts to the avoidance of claims which result from incorrect handling and assist the agents and their clerical forces in meeting the requirements of circulars and new instructions. Several investigators are also employed on the eastern lines of the system.

Congressman Thompson, of Oklahoma, has introduced in the House of Representatives a bill providing that it shall be unlawful for a railroad to demand or receive from the purchaser of a ticket at a point or station in any state, territory or district in the United States, to a point or station in any other state, territory or district, a sum for the entire journey in excess of the combined amount charged by such railroad company in the several states, territories or districts through which the ticket entitles the passenger to transportation. The bill also provides for a penalty of from $100 to $500 for each violation, one-half of the penalty to be paid to the informant.

Considerable opposition has been aroused in the northwestern states because the Southern Pacific has announced that an arbitrary of $17.50 will be charged for the journey over the Shasta route from San Francisco to Portland, in connection with round-trip fares from the east to San Francisco for the Panama-Pacific Exposition in 1915. President Hill of the Great Northern has announced that the plan for the operation by his company of steamships from Astoria to San Francisco does not imply any intention to cut rates or to absorb the Southern Pacific arbitrary. Mr. Hill said that it is worth something to carry passengers from San Francisco to Portland, and that it will be impossible for the northern lines to absorb the cost.

The roads in Official classification territory, following the expressed views of the Interstate Commerce Commission, have begun to file tariffs providing for a charge for "spotting" cars. The provisions and charges contained in the tariffs are identical in all instances, indicating concerted action on the part of the roads. The charges are 5½ cents a ton, with a minimum charge of $2 a car. It is estimated that there are nearly 27,000 private tracks on which cars now are "spotted" by the roads without charge. The tariffs indicate that the charges are not to be imposed in Chicago, St. Louis and certain other excepted places. Spotting is defined as (*a*) "one placement of a loaded car which the carrier has transported"; (*b*) "the taking out of a loaded car from a particular location in the plant for transportation by the carrier"; (*c*) "the handling of the empty car in the reverse direction." Tariffs go into effect May 27.

The Chicago & North Western has recently adopted a new method of showing in its complete timetable folders the date upon which the tables go into effect, this information now being shown at the bottom of the inside of the front cover instead of on the outside of the front cover. The former plan of showing the date at the top of the outside cover page has entailed a considerable waste of folders, as indicated by advice received from distributing companies, ticket agents and others. It was found that persons looking over the folders placed in the folder rack at hotels and ticket offices, seeing the date prominently displayed would assume that a folder bearing the January imprint, for example, would not be current after the close of that month, and ought to be thrown away; whereas it frequently occurs that an issue will remain current for several months. It is believed that the new plan will avoid a very considerable waste of these folders.

The Ford Motor Company and other automobile manufacturers of Detroit, Mich., have filed a brief with the Interstate Commerce Commission on the proposed increase in freight rates and on the proposed charge for spotting service. Objection is made to any advance in rates on automobiles on the ground that automobiles are already paying a high rate, 10 per cent. above first class, with a 10,000 lb. minimum. It is contended that this rate is too high, that an increase in Official Classification territory will necessarily increase the through rates to all points in the United States, and that the charge will fall on the buyer rather than on the shipper because automobiles are invariably sold f. o. b. Detroit. Accompanying the brief is an exhibit showing that in six months the revenue received by the carriers on outbound shipments from the Ford Motor Company was $6,020,158. This was on 122,634 automobiles destined to 26 cities in all sections of the country. The average rate charged per car ran from $33 to $310. The largest number of cars shipped to any single destination was 11,311 sent to Chicago, the freight charges being $239,031. In the year 1913, 59,066 carloads of automobiles were shipped from Detroit, in addition to a large number shipped in less than carloads.

Car Surpluses and Shortages

Arthur Hale, chairman of the committee on relations between railroads of the American Railway Association, in presenting statistical bulletin No. 165A, giving a summary of car surpluses and shortages by groups from December 14, 1912, to April 15, 1914, says: The total surplus on April 15, 1914, was 213,324 cars; on April 1, 1914, 141,525 cars; on April 15, 1913, 70,715 cars; on April 11, 1912, 94,943 cars; on April 12, 1911, 187,219 cars; and on April 13, 1910, 84,887 cars.

A continued increase in surplus cars has brought the largest surplus for this period since 1909, five years. The shortage is practically wiped out.

The increase in surplus box and coal cars is general in all parts of the country.

The total shortage on April 15, 1914, was 455 cars; on April 1, 1914, 2,013 cars; on April 15, 1913, 13,217 cars; on April 11, 1912, 15,554 cars; on April 12, 1911, 1,166 cars; and on April 13, 1910, 7,530 cars.

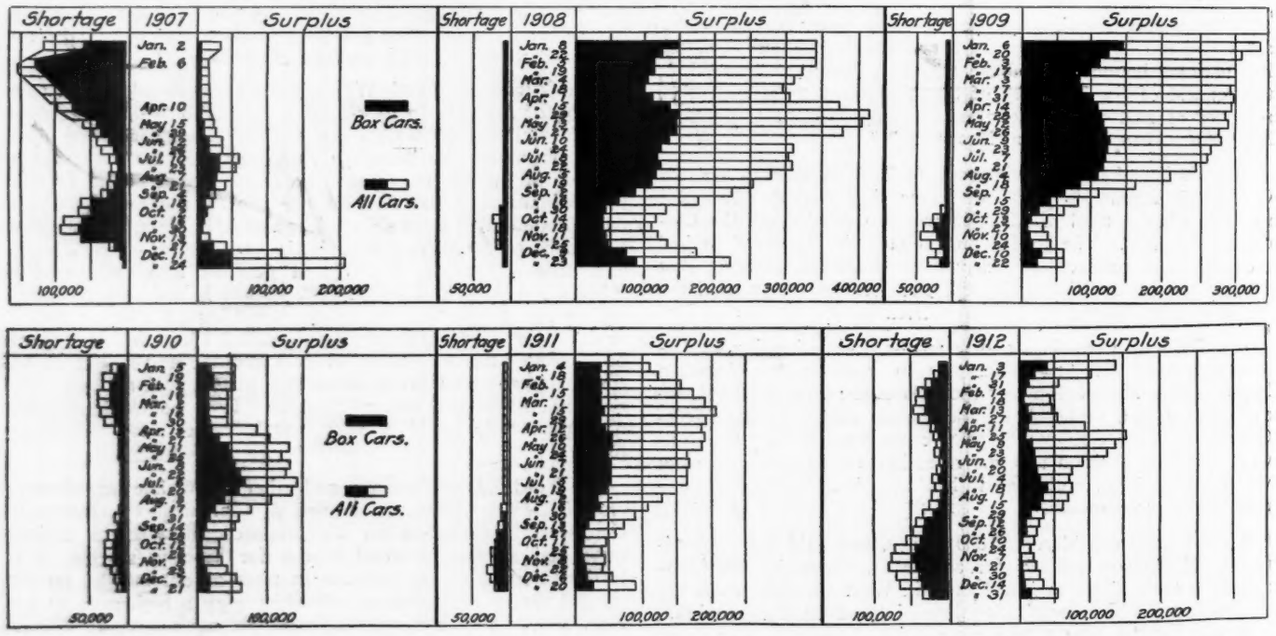
The reduction in shortage is general all over the country.

The accompanying table gives car surplus and shortage figures by groups for the last period covered in the report and the diagram shows total bi-weekly surpluses and shortages from 1907 to 1914.

CAR SURPLUSES AND SHORTAGES

Date	No. of roads.	Surpluses: Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.	Shortages: Box.	Flat.	Coal, gondola and hopper.	Other kinds.	Total.
Group *1.—April 15, 1914	7	390	701	738	307	2,136	0	0	0	42	42
" 2.— " 15, 1914	31	2,992	363	12,965	1,213	17,533	3	0	0	0	3
" 3.— " 15, 1914	26	5,899	1,628	37,170	4,111	48,808	0	0	0	100	100
" 4.— " 15, 1914	11	8,061	1,241	7,354	1,583	18,239	0	0	0	55	55
" 5.— " 15, 1914	22	5,220	1,072	14,147	2,276	22,715	0	50	0	0	50
" 6.— " 15, 1914	27	14,229	974	10,043	7,511	32,757	22	18	19	2	61
" 7.— " 15, 1914	4	463	80	1,524	2,012	4,079	0	0	0	0	0
" 8.— " 15, 1914	18	5,139	285	2,972	2,492	10,888	10	0	0	1	11
" 9.— " 15, 1914	12	3,921	246	549	1,597	6,313	0	0	5	0	5
" 10.— " 15, 1914	22	10,576	1,804	4,677	10,597	27,654	0	0	0	0	0
" 11.— " 15, 1914	5	17,150	1,812	0	3,240	22,202	128	0	0	0	128
Total	185	74,040	10,206	92,139	36,939	213,324	163	68	24	200	455

*Group 1 is composed of New England lines; Group 2—New York, New Jersey, Delaware, Maryland and Eastern Pennsylvania lines; Group 3—Ohio, Indiana, Michigan and Western Pennsylvania lines; Group 4—West Virginia, Virginia, North and South Carolina lines; Group 5—Kentucky, Tennessee, Mississippi, Alabama, Georgia and Florida lines; Group 6—Iowa, Illinois, Wisconsin and Minnesota lines; Group 7—Montana, Wyoming, Nebraska, North Dakota and South Dakota lines; Group 8—Kansas, Colorado, Missouri, Arkansas and Oklahoma lines; Group 9—Texas, Louisiana and New Mexico lines; Group 10—Washington, Oregon, Idaho, California, Nevada and Arizona lines; Group 11—Canadian lines.



Car Surpluses and Shortages, 1907 to 1914

National Industrial Traffic League

The spring meeting of the National Industrial Traffic League was held at the Hotel Statler, Cleveland, Ohio, on April 23 and 24. The attendance was larger than at any previous meeting of the league except the meetings which have been held in Chicago. The principal action taken was the approval of the code of rules for weighing and re-weighing carload freight, which had been agreed upon by a committee on weighing of the league, and a sub-committee of the Committee on Relations between Railroads of the American Railway Association. These rules are published in another column. The league also adopted the following resolutions regarding the proposed elimination of Rule No. 10, in Official Classification:

"Whereas, The railroads in Official Classification territory have maintained for approximately 25 years what is known as Rule No. 10, providing for the unrestricted mixture of all commodities; and

"Whereas, The industrial and manufacturing interests of said territory have been developed under this rule with the result that the commercial conditions have shaped themselves with reference thereto; and

"Whereas, The general shipping interests in said territory feel that the elimination of said rule, or any material change in

same, would result in great hardship and injury; be it therefore

"Resolved, That the National Industrial Traffic League, for the reasons above stated, is opposed to any such radical change in classification rules as the elimination of Rule No. 10 in said territory contemplates; and be it further

"Resolved, That this expression of attitude on this question is not to be understood as advocating the principle of Rule No. 10 in any other classification territory."

In connection with the report of the Freight Claims Committee, there was considerable discussion because some railways have declined to accept claims not presented on the standard uniform form for the presentation of loss and damage claims recently approved by the Interstate Commerce Commission, in its identical form, although the forms presented contained the information called for on the standard form. In endorsing this form the league had specified that its approval was given with the understanding that it should not be arbitrarily enforced, and the committee will take up the subject with the railways in the endeavor to bring about the acceptance of forms which contain the information called for, although not in the identical form of the standard form.

The Tariffs Committee reported that it had received a letter from the Interstate Commerce Commission regarding the proposal which had been presented to it by the league on the subject of uniform symbols in tariffs and classifications, stating that the commission will give the matter careful consideration.

In connection with the report of the committee on Car Demurrage and Storage, there was an informal discussion because of the understanding that several of the demurrage associations are seeking to bring about the discontinuance of the average agreement. The league adopted a resolution expressing its opposition to the abolition of this agreement, which is a part of the Uniform Code of Demurrage Rules. On recommendation of the Tariffs Committee and the Classification Committee, a resolution was adopted recommending that the Official, Southern and Western Classifications should be published in one volume. The Tariffs Committee will also take up with the carriers in Official Classification territory the question of issuing more committee tariffs in place of a large number of individual issues.

The Committee on Car Demurrage and Storage reported that the new Code of Storage Rules, the result of negotiations between the committee and the Committee on Relations between Railroads of the American Railway Association, has been adopted by the American Railway Association to become effective May 1. Among the provisions of these rules which represent changes from former rules, are: Carload shipments of explosives or other dangerous articles are subject to both demurrage and storage rules; shipments of less than carload freight loaded into or delivered direct from cars are subject to storage rules, but when the loading or unloading is done by shipper or consignee, either as required by classifications or tariffs, or at request of shipper or consignee, the cars are subject to demurrage rules, and storage rules do not apply.

Rule 2 on notification provides that notice shall be sent or given consignee by carrier's agent in writing, or as otherwise agreed to, within 24 hours after arrival of shipments and billing at destination. Section B on Refused or Unclaimed Freight provides that where shipments have been plainly marked with the consignor's name and address, preceded by the word "from," notice shall be immediately sent or given consignor of refusal of L. C. L shipments. Unclaimed L. C. L. shipments will be treated as refused after 15 calendar days from expiration of free time. Notice shall be sent or given the consignor of unclaimed or refused shipments of explosives or other dangerous articles on hand 48 hours, provided written request is received for this information by agent at point of origin at time of shipment.

Where consignor requests that notice of unclaimed or refused shipments be telegraphed, this may only be done at his expense.

Rule 3, as to free time, provides that 48 hours free time will be allowed on all commodities, except the more dangerous explosives, for the removal of inbound freight from car or railroad premises, or to complete a shipment and furnish forwarding directions for outbound freight. Twenty-four hours free time will be allowed on the more dangerous explosives for the removal of inbound freight from car or railroad premises, or to complete a shipment and furnish forwarding directions for outbound freight.

Section E provides that such additional free time shall be allowed as has been lost through delay by United States Customs.

Commission and Court News

INTERSTATE COMMERCE COMMISSION

The commission's report on the New York Central-Lake Shore consolidation is very briefly abstracted in Railway Financial News.

The commission has further suspended from May 1 to November 1 certain schedules in tariffs of F. A. Leland, agent, increasing rates on malt in car loads, from various interstate points to Ft. Worth, Tex., and other points in Texas.

The commission has further suspended from May 1 to November 1 certain new rules in tariffs of W. H. Hosmer, agent, affecting the carload movement of potatoes from producing points in Minnesota and Wisconsin during the winter season.

The commission has suspended from April 23 and certain later dates to August 13, certain schedules in tariffs of various carriers increasing class and commodity rates between Quincy, Ill., Hannibal, Mo., St. Louis, Mo., and points east of the Indiana-Illinois state line.

The commission has suspended from May 1 to August 29 a Chicago, Milwaukee & St. Paul tariff increasing rates on lumber in car loads, from certain points in Canada and Minnesota, to points in North and South Dakota. The increases range from 1 to 4½ cents per 100 lb.

The commission has suspended from May 1 to August 29 certain schedules in tariffs of W. H. Hosmer, agent, increasing from fourth to third class the rating on live poultry handled in poultry cars or in stock cars, in car loads, between certain points in western classification territory.

The commission has suspended from April 23 to July 30, certain schedules in a Pere Marquette tariff, canceling through rates on coal and coke, from interstate points to Crawford avenue, Greenwood avenue, Peterson avenue and Weber avenue, points on the Chicago & North Western, in Chicago.

The commission has further suspended from May 1 to November 1 certain schedules in tariffs of W. H. Hosmer, agent, the Chicago, Peoria & St. Louis, and the Chicago, Rock Island & Pacific, increasing rates on malt, in car loads from St. Paul, Minn., and other points, to New Orleans, La., and certain other points.

The commission has further suspended from May 1 to November 1 certain schedules in tariffs of the eastern carriers increasing class rates from New York and other eastern points of origin to St. Paul, Minn., and other destinations via rail, lake and rail routes. The operation of these schedules was previously suspended from January 1 to May 1.

The commission has suspended to August 23, certain schedules in tariffs of W. P. Emerson, agent, and M. P. Washburn, agent, reducing rates on black strap molasses in carloads, imported from foreign countries through the ports of Mobile, Ala., Gulfport, Miss., and New Orleans, La., destined to Council Bluffs, Iowa, Clinton, Iowa, and other points.

The commission has suspended to August 13, certain schedules in tariffs of the Akron, Canton & Youngstown, the Bessemer & Lake Erie, the Buffalo, Rochester & Pittsburgh, the Chicago & Alton, and the Dunkirk, Allegheny Valley & Pittsburg, increasing proportional rates to and from upper Mississippi river crossings on traffic originating at or destined to points east of the Indiana-Illinois state line, and originating at or destined to points beyond the Mississippi river crossings.

Examiner Wood, of the Interstate Commerce Commission, held a hearing in Chicago on April 23, in a case involving proportional rates on coal from the Ohio coal fields to Mississippi river crossings which were canceled by the railways. The cancellation has been suspended by the commission. Examiner Wood also held a hearing on April 22, on gravel and sand switching charges in Chicago. The commission has suspended until June 22 a new Lowrey tariff, making a minimum switching

charge of 2½ cents per hundred pounds for the Chicago district. A number of shippers appeared in opposition to the rate.

Coal Rates to Dewey, Okla.

Opinion by Commissioner Clements:

The commission finds that the Missouri, Kansas & Texas has not justified proposed increases in the rates on coal from 45 cents per ton on slack, and 55 cents per ton on run-of-mine coal, to 77 cents on both slack and run-of-mine coal from Fleming and West Mineral, Kan., to Dewey and Bartlesville, Okla. (30 I. C. C., 115.)

Petroleum Rates from Okmulgee, Okla., Reduced

American Refining Company v. St. Louis & San Francisco et al. Opinion by the commission:

The complainant, a corporation refining oil at Okmulgee, Okla., alleges that the rate of 17 cents per 100 lb. on petroleum road oil and petroleum tailings from Okmulgee to St. Louis and East St. Louis is unreasonable to the extent that it exceeds the rate of 12½ cents on like traffic from Vinita, Okla. Okmulgee and Vinita are respectively 471 and 360 miles distant from St. Louis. The commission holds the 17 cent rate to be unreasonable, as alleged, and orders that the rate be made 14 cents for the future. (30 I. C. C., 103.)

Chattanooga Log Rates

Opinion by Commissioner McChord:

The commission finds unreasonable a schedule of interstate mileage rates which will result in material advances over the present rates on logs consigned to Chattanooga. Another scale proposed by respondents since the suspension of the interstate mileage rates is allowed to become effective, however, because it gets rid of inconsistencies in the present rates and includes rates which compare favorably for charges for similar service. The approved scale contains increases over the present rates, but they are not as great as those proposed in the suspended tariff. (30 I. C. C., 36.)

Rates on Brooms

Wichita Business Association v. Atchison, Topeka & Santa Fe et al. Opinion by Commissioner Clark:

The commission finds that the present any quantity rates of $2.10 and $2 per 100 lb. on brooms from Wichita, Kan., to Pacific coast terminals and North Pacific coast points, respectively, as compared to any quantity rates of $2.10 to California terminals from territory east of the Rocky mountains and $2 to North Pacific coast terminals from points east of the Indiana-Illinois state line, do not result in undue discrimination against Wichita producers. It is also held that the relation between the rates on brooms and broom corn is just and that it does not give undue preference to Pacific coast producers or to traffic in the raw material. The commission does not believe that the establishment of special carload rates lower than the present any quantity rates is necessary. (30 I. C. C., 45.)

Rates on Staves and Heading from Columbus, Miss., to Points in the Southeast

Lucas E. Moore Stave Company v. Southern Railway et al. Opinion by Commissioner Clements:

The complainant, engaged in the manufacture of staves and heading at Columbus, Miss., challenges the rates on these commodities from Columbus to 25 points in the southeast, including Birmingham, Atlanta, Savannah, etc. The carriers subsequent to the filing of the complaint have revised the rates involved, and while the latter are not as low as those requested by the complainant they place Columbus on the same basis as Decatur, Ala., and Meridian, Miss. The commission holds the revised rates to be reasonable. No reparation is awarded. (30 I. C. C., 105.)

Rates on Coal to Chicago Suburban Points

Hammerschmidt & Franzen Company v. Chicago North Western et al. Opinion by Commissioner Clark:

It is alleged that the rates on coal from mines in Pennsylvania, West Virginia and Ohio, etc., to Elmhurst, on the Chicago & North Western, just outside of the Chicago switching district, are unreasonable as compared with the rates to Proviso, an interchange point on the North Western and the Indiana Harbor Belt. The rate on bituminous coal to the latter point is the flat Chicago rate, but on anthracite the rate is made up of the flat Chicago rate plus the North Western's local or proportional rate of 40 cents per ton from Chicago, less a charge of $4 per car, which is absorbed by the eastern carriers. To Elmhurst, however, but 3 miles distant, through rates are made on combination of the flat rate to Chicago plus the local or proportional rates from Chicago of 50 cents per ton on bituminous and 60 cents on anthracite coal. The commission finds that such an arrangement results in discrimination in favor of dealers at Proviso and Melrose Park.

There must be some definite limits to the switching group and a resulting difference in the rates which apply to points within it as compared to those which apply without, but in this case the difference is too great. It is held, therefore, that the rates to Elmhurst should not exceed the rates applicable to Chicago by more than 45 cents per ton on anthracite, or by more than 35 cents per ton on bituminous coal via any junction point in the Chicago district. Following the usual procedure of the commission in like cases, no reparation is awarded. (30 I. C. C., 71.)

Lombard Brick & Tile Company et al. v. Chicago & North Western et al. Opinion by Commissioner Clark:

In this case, following the findings in *Hammerschmidt & Franzen Company* case the commission holds that the rates from points east of the Illinois-Indiana state line on anthracite and bituminous coal to Lombard, Glen Ellyn, Wheaton and West Chicago are unduly prejudicial to the latter points and unduly preferential to Chicago and Proviso, to the extent that they exceed the rates to the latter points by more than the following amounts on anthracite coal, to Lombard, Glen Ellyn and Wheaton, 50 cents; to West Chicago, 55 cents; on bituminous coal, to Lombard, 35 cents; to Glen Ellyn and Wheaton, 39 cents; to West Chicago, 48 cents. No reparation is awarded. (30 I. C. C., 84.)

Coal Rates from Indiana and Illinois Mines to Stations in Iowa

Opinion by Commissioner Clements:

The commission finds that the carriers have justified proposed increases ranging from 10 to 40 cents per ton in the rates on coal from mines on the Chicago & Eastern Illinois in southern Indiana and Illinois to stations on the Mason City & Clear Lake, an electric line from Mason City to Clear Lake, Ia., and the Inter-Urban, an electric line from Des Moines, Ia., through Altoona to Colfax, and from Des Moines through Granger to Perry and Woodward. The proposed changes will restore the rates on coal to these points to the established basis formed by adding to the rates on traffic to Iowa from southern mines in Indiana and Illinois fixed differentials over the rates from the northern Illinois group. (30 I. C. C., 108.)

Changes in Classification of Fruits and Vegetables Not Permitted

In re rates on fruits and vegetables between points in California and points in Nevada, Arizona and other states. Opinion by Commissioner Meyer:

The ratings on fresh fruits and vegetables in western classification are first, second and third class for less-than-carload shipments, and third, fourth and fifth class and class C for carloads. The carriers who, however, have had an exception sheet providing ratings of fourth class for less than carloads and class C for carloads, have now proposed by the tariff under discussion to advance the classifications to the ratings provided by the western classification for less-than-carload shipments, and to fifth class for carload shipments, which were classified higher than class C, the class C rating to remain in effect on the vegetables that are classified at class C in the western classification. The rates between points in California and points in Nevada and Arizona are principally involved in this case. The commission finds that in the case of the rates to Nevada points the proposed changes will result in some cases in the establishment of rates from 20 to 80 per cent. higher than those at present in effect. It is held that the present Nevada rates furnish adequate revenue, and that the old ratings or commodity rates

equivalent to the rates under these ratings at the time the suspended schedule was filed must be maintained for the future. The situation in Arizona is more complicated. Tariff changes have been made with the net result stated in brief as follows: Subsequent to the suspension of the proposed changes in classification, the class rates have been reduced, and are lower than those in effect at the time of the filing of the suspended schedules. The carriers under special permission of the commission have, however, issued commodity rates which have taken the place of the former class rates, and which are in general on the same basis as the class rates in effect when the schedule was filed. It is held that these commodity rates are reasonable, and that they should be permitted to remain in effect. The proposed changes in classification are, therefore, to be canceled. (30 I. C. C., 56.)

STATE COMMISSIONS

The Illinois Public Utilities Commission has further suspended until July 1, the proposed increase of one cent per 100 lb. on grain rates in Illinois.

The Railroad Commission of California has arranged with the transportation companies in the state to reduce the rates on watermelons in carloads.

The Kansas Public Utilities Commission held a hearing at Kansas City, Kan., on April 22, on a complaint filed by the Commercial Club of the city, asking the commission to compel the railways to provide better facilities for handling freight in Kansas City, Kan. Following the hearing the members of the commission made an inspection of the terminals.

The Montana Railroad Commission held a rehearing at Helena, April 20, on its recent order making general reductions in the "distributing" freight rates throughout the state. W. P. Kenney, vice-president of the Great Northern, and R. M. Calkins, traffic manager of the Chicago, Milwaukee & St. Paul, were the principal witnesses. Representatives of the state jobbers' association asked for a postponement of the hearing for 90 days, on the ground that the jobbers were not sure whether they wanted a reduction in distributing rates.

The California Railroad Commission has rendered a decision denying the application of the Pacific Freight Tariff Bureau to increase the present minimum charge of 25 cents for less than carload shipments. The various carriers had applied to the commission for an order authorizing them to charge class rates at which all commodities would move on a 100 lb. basis. This would have permitted an increase upon every freight shipment moving between points in the state, the minimum rate being the 100-lb. class rate.

The Ohio Public Utilities Commission, in its annual report, asks for additional legislation to increase its powers. Among its recommendations are the following:

Give the commission authority to suspend or postpone the effective date of freight tariff schedules; fix a definite time for the payment of assessments levied on railroads and utilities for the maintenance of the commission; require notice to and approval by the commission prior to the abandonment of stops, stations and agencies by steam and interurban railroads; amend the existing statute specifying the number of trainmen required on passenger trains so the law may be readily understood, applied and interpreted; require railroads and public utilities to notify the commission immediately of changes in the personnel of the responsible officers; require the installation of block signals on railroads where gross earnings justify such expenditures; require railroads to give 30 days' notice of changes in rates unless otherwise ordered by commission; authorize the commission to require locomotives to be taken out of service when Ohio boiler inspection laws and rules have not been complied with; require railroad companies to pay the expenses and loss in wages of their employees compelled to appear before the commission in investigations made necessary by the company's neglect or default; require all actions which may be brought against the commission in the court of common pleas to be brought in Franklin county; authorize the commission to order the refunding of illegal or unreasonable charges by railroads and utilities. Exempt the members of the commission and all its employees from being compelled to testify in civil actions, when the matter out of which the action grew has been officially investigated by the commission or its employees; repeal the law which fixes the fiscal year for railroad companies; give the commission power on its own motion to investigate and to make appropriate orders affecting the rules, regulations and practices of carriers.

PERSONNEL OF COMMISSIONS

Joseph H. Lovett has been appointed special investigator in charge of the safety appliance division of the engineering department of the Illinois Public Utilities Commission.

COURT NEWS

The Supreme Court of the United States, in a decision handed down this week, holds that a man injured while engaged in switching a car which is being used in intrastate traffic does not come within the federal employers' liability act, simply because the next thing which he intended to do was an act of interstate commerce.

The Supreme Court of the United States on Monday last, in the case of Baer Brothers, of Leadville, Col., has sustained a claim against the carrier for an overcharge on beer shipped from St. Louis, holding that it was not necessary that the Interstate Commerce Commission should decide what is a reasonable rate before the consignee could recover an overcharge.

The Supreme Court of the United States on Monday of this week, in a decision setting aside a judgment of $7,500, rendered by the Supreme Court of North Carolina, in favor of Horton, holds that in the federal employers' liability law of 1908, in the clause making a railroad liable for personal injuries if, at the time of the injury, it is violating a law, the word "law" means federal law and not a state law.

Arguments on a motion to transfer state suits against Missouri railroads for a refund of alleged excess rates paid by passengers and shippers while the Missouri rate cases were in litigation, were begun last week in the federal court at Kansas City. A motion was filed several weeks ago by attorneys for the Chicago, Milwaukee & St. Paul, the Chicago & Alton and the Kansas City Southern, who want the cases settled in the United States court. Judge Shelton, of the state court at Macon, Mo., on April 24 denied the application of the Chicago, Burlington & Quincy to remove its case to the federal court.

Carrier Held Liable for Fraudulent Bill of Lading

In the Supreme Court of New York, Justice Newberger, sitting in New York City, last week, the Albany bill-of-lading case was decided for the second time against the Delaware & Hudson Company. The suit was brought to hold the company liable for the acts of H. C. Palmer, its agent at Albany, who issued bills of lading for freight that never was received by him. The plaintiff had secured a verdict in June, 1911, but the decision in that case had been reversed by the Appellate division of the court, which ordered a new trial. The plaintiff is Otto Keusch, a New York grain merchant, and the verdict is for $103,261. Other suits are pending. Palmer, freight agent at Albany, signed blank bills of lading and turned them over to Gibson Oliver, treasurer of the Durant & Elmore Company, a large grain house.

RAILWAY DEVELOPMENT IN CHINA.—The Board of Communications in Peking and the British and Chinese Corporation, Ltd., have signed an agreement for the construction of approximately 600 miles of railway from Nanking to Nanchang and Ping Siang, where connection will be made with the Ping Siang and Changsa and Hankow-Canton Railways. This line, in conjunction with the Pukow-Sinyangchow Railway, will materially strengthen British interests on the Yangtze. The railway will traverse a very rich country, and there will be no special difficulties of construction. The line will go via Ning-kwo-fu and Hwei-chow, and arrangements have been made for a connection either with Hangchow or Shanghai, and also for a railway from Nanchang to Wuchang, giving an aggregate length of nearly 1,000 miles, the construction of which will necessitate a loan of $40,000,000. This will bear interest at 5 per cent., and is to be paid in 45 years. It will be secured by a mortgage on the line and its revenues, backed by a government guarantee.

Railway Officers

Executive, Financial, Legal and Accounting

A. S. Steirer has been elected auditor of the Union Terminal Company, with headquarters at Dallas, Tex.

Santiago Mendez, consulting engineer of the National Railways of Mexico, at Mexico City, Mex., has been appointed executive vice-president, with headquarters at Mexico City.

F. C. Dillard, vice-president and general counsel of the Rock Island Lines, having resigned, effective May 1, to engage in private practice, this position is abolished. M. L. Bell, general attorney, is appointed general solicitor, with headquarters at Chicago.

F. Dane, commissioner of the Temiskaming & Northern Ontario, with office at Toronto, Ont., has resigned, and it is understood has accepted a position under the Dominion government as trade commissioner at Glasgow, Scotland. George W. Lee, general agent of the Temiskaming & Northern Ontario, has been appointed commissioner and land agent, and his former position has been abolished.

Operating

T. W. Hansell, superintendent of terminals of the Atlantic Coast Line at Jacksonville, Fla., has been appointed assistant district superintendent, with headquarters at Sanford.

H. H. Shepard has been appointed superintendent of the Buffalo division of the Delaware, Lackawanna & Western, with office at Buffalo, N. Y., succeeding L. J. Ferritor, resigned.

C. L. MacManus, general agent of the St. Louis, Brownsville & Mexico at Brownsville, Tex., has been appointed supervisor of demurrage for Texas, representing the American Railway Association, with headquarters at Austin, Tex.

The Trinity & Brazos Valley announces that the position of superintendent of car service is abolished, H. S. Bottoms being assigned to other duties. Car records and details pertaining thereto will be handled by L. H. Attwell, Jr., auditor, with headquarters at Houston, Tex.

A. K. Stone has been appointed trainmaster of the Dakota division of the Great Northern at Grand Forks, N. D., in place of S. J. O'Gara, transferred to the Willmar division. Mr. Stone for the past nine years has been connected with the construction of the Panama canal, in charge of the transportation department of the Culebra division and master of transportation of the Panama Railroad.

J. M. Rapelje, general superintendent of the Northern Pacific at Livingston, Mont., has been appointed assistant general manager, with headquarters at St. Paul, Minn.; A. V. Brown, superintendent of the Lake Superior division at Duluth, Minn., has been appointed general superintendent of the Central district, with headquarters at Livingston, succeeding Mr. Rapelje; W. H. Strachan, superintendent of the Dakota division, at Jamestown, N. Dak., succeeds Mr. Brown and W. E. Berner, trainmaster at Livingston, succeeds Mr. Strachan.

F. S. Collins, who has been appointed superintendent of the Mobile division of the Southern Railway, with headquarters at Selma, Ala., as has been announced in these columns, was born on June 8, 1880, at Moberly, Mo. He was educated in the grammar and high schools, and began railway work in July, 1896, as a messenger on the Missouri, Kansas & Texas, and later was telegraph operator, on the same road until February, 1899. He was then telegraph operator on the Wabash for four years. In February, 1903, he went to the Southern Railway and has been in the continuous service of that road ever since. He was first telegraph operator on the Charleston division at Charleston, S. C., and soon afterwards was promoted to despatcher on the same division. In January, 1907, he was appointed block inspector on the Charlotte division at Greenville, S. C., and in March, of the following year, returned to the Charleston division as chief train despatcher at Rock Hill. In October, 1910, he was appointed trainmaster on the Louisville division, at Louisville, Ky., and in November, 1912, was transferred in the same capacity to the Charlotte division at Greenville, S. C., which position he held at the time of his recent appointment as superintendent of the Mobile division of the same road, as above noted.

R. E. Simpson, who has been appointed general superintendent of the Northern district of the Southern Railway, with headquarters at Greensboro, N. C., as has been announced in these columns, was born on October 20, 1870, at Glen Alpine, N. C., and was educated in the common schools. He began railway work in April, 1884, as water boy on the Richmond & Danville, now a part of the Southern Railway. From May, 1886, to June of the following year, he was section hand and subsequently was section master until February, 1889, when he was appointed extra gang foreman and conductor. From May, 1892, to September, 1899, he was a freight conductor on the Lehigh Valley. He then went to the Southern Railway as supervisor on the Asheville division, and has been in the continuous service of that road ever since. From June, 1902, to September, 1903, he was roadmaster on the Asheville division, and was subsequently, for two years, roadmaster and trainmaster at Bryson City, N. C. He was then appointed assistant superintendent of the Atlanta division, at Atlanta, Ga., and from January to December, 1907, was superintendent of the Spartanburg division at Columbia, S. C. He was then appointed superintendent of the Asheville division, at Asheville, N. C.; since May, 1909, he was superintendent of the Knoxville division, with headquarters at Knoxville, Tenn., and now becomes general superintendent of the Northern district of the same road, as above noted.

Traffic

F. G. Fitz-Patrick, soliciting agent of the Chicago & North Western at Pittsburgh, Pa., has been appointed passenger agent, with office at New York.

John D. Carter has been appointed commercial agent of the Atchison, Topeka & Santa Fe at Detroit, Mich., vice C. J. Kendall assigned to other duties, effective May 1.

L. Van Orden has been appointed general agent of the Lake Tahoe Railway & Transportation Company at San Francisco, Cal., and N. R. Martin has been appointed general agent at Los Angeles.

J. A. McTague, contracting freight agent of the Delaware, Lackawanna & Western, at New York, has been appointed contracting freight agent at Minneapolis, Minn., succeeding D. J. Collins, deceased. H. G. E. Pansius, contracting freight agent, at New York, succeeds Mr. McTague, and Gordon E. Gaines succeeds Mr. Pansius.

F. G. Adams, who was recently appointed commercial agent of the Grand Trunk at Winnipeg, Man., has been appointed also division freight agent of the Grand Trunk Pacific, with office at Winnipeg, succeeding W. J. Hunter, deceased, and W. J. P. McGregor, commercial agent of the Grand Trunk at Moncton, N. B., succeeds Mr. Adams as division freight agent of the Grand Trunk Pacific, with office at Edmonton, Alta.

C. E. Crane, general eastern freight agent of the Lehigh Valley, at New York, has resigned to go into the advertising business and his former position has been abolished. J. S. McCrea, division freight agent at Ithaca, N. Y., has been appointed to the new position of city freight agent, with headquarters at New York, and assumes the duties formerly performed by Mr. Crane. Oliver F. Johnson, traveling freight agent at New York, has been appointed division freight agent, with headquarters at Ithaca, succeeding Mr. McCrea and Edward F. Neagle, soliciting freight agent at New York, succeeds Mr. Johnson.

Engineering and Rolling Stock

F. Von Sprecken has been appointed assistant engineer of the Atlantic Coast Line, with headquarters at Savannah, Ga.

Mark Baer has been appointed master mechanic of the Colorado, Kansas & Oklahoma, with headquarters at Scott City, Kan.

P. O. Wood, assistant superintendent of locomotive performance of the St. Louis & San Francisco, has been appointed superintendent of locomotive performance, with headquarters at Springfield, Mo., to succeed Robert Collett, resigned. W. H. Malone succeeds Mr. Wood, with office at Springfield.

Louis Chevalier, who has been appointed bridge engineer of the Seaboard Air Line, with headquarters at Norfolk, Va., as has been announced in these columns, was born on May 3, 1882, at Naugatuck, Conn., and was graduated from Tufts College in 1905. In June of the same year, he became a draftsman for the American Bridge Company at Detroit, Mich., remaining in that position until November, 1906, when he began railway work as draftsman on the Seaboard Air Line and later was promoted to chief draftsman. He was subsequently appointed assistant bridge engineer on the same road, and in February, 1910, went to the Baltimore & Ohio, as assistant engineer in the bridge department, at Baltimore, Md. From August, 1910, to June, 1913, he was principal assistant to J. E. Greiner, consulting bridge engineer of the Baltimore & Ohio at Baltimore, and then to April, 1914, was engineer for the Stillman-Delehanty-Ferris Company, engineers and contractors, Jersey City, N. J. Mr. Chevalier left the latter position on April 12, to return to the service of the Seaboard Air Line as bridge engineer, as above noted.

Ellis A. Frink, whose appointment as principal assistant engineer of the Seaboard Air Line, with headquarters at Norfolk, Va., has been announced in these columns, was born on February 25, 1862, at Germantown, Philadelphia, Pa., and in June, 1880, was graduated from the High School at Westerly, R. I. He began railway work in March, 1904, as a draftsman in the bridge engineer's office of the Baltimore & Ohio, designing bridges in the approach to the new Union station at Washington, D. C. From November, 1904, to February, 1906, he was superintendent of construction of the Virginia Bridge & Iron Company at Roanoke, Va., and then was appointed bridge engineer of the Seaboard Air Line, which position he held at the time of his recent appointment as principal assistant engineer of the same road, as above noted. Previous to entering railway service, Mr. Frink was connected with the Berlin Iron Bridge Company, East Berlin, Conn., and the Structural Iron Company, Baltimore, Md., and from June, 1900, to 1902, was chief engineer and general manager of the Structural Iron & Steel Company. He was then in business for about two years under the firm name of Frink & Hazen at Baltimore.

E. A. Frink

Purchasing

E. J. Roth, whose appointment as supply agent of the Chicago, Indianapolis & Louisville, with headquarters at Lafayette, Ind., has already been announced in these columns, entered the supply department of the Chicago, Burlington & Quincy at Lincoln, Neb., in February, 1902. For several years he was employed as laborer, foreman and clerk, and was then appointed chief clerk to the supply agent at Omaha, Neb. In April, 1907, he was transferred to the headquarters of the general storekeeper in Chicago as chief clerk in charge of fuel, rail and tie department, and two years later he was made chief clerk to the general storekeeper. Mr. Roth was appointed assistant general storekeeper in February, 1910, which position he held until April 1, when he resigned to go to the Chicago, Indianapolis & Louisville to organize and operate a supply department, with the title of supply agent.

NEW RAILWAY STATION IN JAPAN.—The Japanese railway authorities are proposing to spend $500,000 on the reconstruction of the railway station at Schichijo, Kyoto, on the Tokaido line. The station's capacity will be enlarged three times by the proposed changes.

Equipment and Supplies

LOCOMOTIVE BUILDING

THE BUTTE, ANACONDA & PACIFIC has ordered 4 electric locomotives from the General Electric Company.

THE NEW PARK & FAWN GROVE has ordered one mogul type locomotive from the Baldwin Locomotive Works.

THE OCEAN SHORE RAILWAY has ordered two mogul type locomotives from the Baldwin Locomotive Works.

THE PEKIN-MUKDEN RAILWAY has ordered 2 consolidation type locomotives from the Baldwin Locomotive Works.

THE ST. LOUIS, BROWNSVILLE & MEXICO has ordered 15 consolidation type locomotives from the Baldwin Locomotive Works.

THE ROWLAND LUMBER COMPANY, Norfolk, Va., has ordered one prairie type locomotive from the Baldwin Locomotive Works.

THE TEXAS LONG LEAF LUMBER COMPANY, New Willard, Tex., has ordered one prairie type locomotive from the Baldwin Locomotive Works.

THE HAVANA CENTRAL is in the market for 13 ten-wheel and 1 consolidation type locomotives. These locomotives are to be used by the Cuban Central.

CAR BUILDING

THE NORFOLK & WESTERN is building 65 caboose cars in its own shops.

THE NASHVILLE, CHATTANOOGA & ST. LOUIS has ordered 6 passenger cars from the American Car & Foundry Company.

THE SOLVAY PROCESS COMPANY, Syracuse, N. Y., has ordered 50 phosphate cars from the American Car & Foundry Company.

THE ELECTRIC SHORT LINE RAILWAY, Minneapolis, Minn., has ordered 2 70-ft. gas-electric cars from the General Electric Company.

THE DELAWARE, LACKAWANNA & WESTERN is in the market for 500 50-ton steel hopper cars, and 100 36-ft., 60,000 lb. capacity, and 100 40-ft., 60,000 lb. capacity automobile cars.

THE GREAT NORTHERN is reported to have ordered 1,000 refrigerator cars from Haskell & Barker Car Company and 75 express refrigerator cars from the Barney & Smith Car Company.

THE HAVANA CENTRAL is in the market for 20 30-ton box, 220 22-ton flat, 15 15-ton flat and 25 15-ton box cars and 40 caboose cars. These cars will be purchased for the Cuban Central, a controlled road.

THE LOUISVILLE & NASHVILLE has ordered 700 steel underframes from the Pressed Steel Car Company and 700 steel underframes from the Mount Vernon Car Manufacturing Company, and will build at its South Louisville shops 200 40-ton ventilated box, 100 40-ton stock, 500 40-ton box, 100 40-ton flat and 500 50-ton gondola cars.

THE CHICAGO, MILWAUKEE & ST. PAUL, reported in the *Railway Age Gazette* of April 17 as being in the market for 10 coaches and 11 sleeping, one dining, 2 combination passenger and baggage and 2 combination mail and baggage cars, is also in the market for 2 drawing, 2 cafe observation and 3 eight-section drawing room observation cars.

IRON AND STEEL

THE NORFOLK & WESTERN has released 7,000 tons of rails on an old contract to the Illinois Steel Company.

Supply Trade News

C. H. Burt has been appointed sales representative of the railroad department of the Glass Founders' Corporation, Inc., New York.

The Union Fibre Company, Winona, Minn., has moved its Chicago office from room 1613 Great Northern building to the Railway Exchange building.

The Chicago office of the Pantasote Company, formerly in the Fisher building, is now located in the Peoples Gas building, 122 South Michigan avenue.

R. C. Cole has joined the staff of the pneumatic tool department of the Ingersoll Rand Company, New York, and has been stationed at the Chicago office.

The engineering and contracting firm of MacArthur Brothers Company, New York, has moved its Chicago office to room 1892 Continental & Commercial Bank building.

The Taylor-Wharton Iron & Steel Company, High Bridge, N. J., Wm. Wharton, Jr., & Company, Inc., Philadelphia, Pa., and the Tioga Steel & Iron Company, Philadelphia, Pa., have moved their Chicago office to room 1880 Continental & Commercial Bank building.

The general offices of the United States Light & Heating Company will be moved on May 20 from 30 Church street, New York, to the company's plant at Niagara Falls, N. Y. This transfer will bring together in one place the administrative, sales, engineering and production departments.

The Roberts & Schaefer Company, Chicago, has concluded arrangements whereby it will supply a 400-ton reinforced concrete four-track balanced bucket locomotive coaling station, to be installed in the vicinity of Havana, Cuba, for the Snare & Triest Company, New York, which has the contract for the new terminal of the United Railways of Havana in that city.

F. Hallett Lovell, Jr., has been elected president and treasurer of F. H. Lovell & Company, Arlington, N. J., succeeding James H. Callender, who was formerly president, treasurer and general manager. Mr. Lovell is also president and treasurer of the Lovell-McConnell Manufacturing Company, Newark, N. J. He was formerly and for about 15 years actively interested in F. H. Lovell & Company, which was founded by his father 52 years ago. A. D. Hobbie, vice-president, has been appointed general manager.

J. B. Berry, who resigned April 1, as assistant to the president of the Chicago, Rock Island & Pacific, as noted in a previous issue, announces the opening of an office as consulting engineer. He will be associated with Messrs. C. P. Howard and S. S. Roberts, under the firm name of Berry, Howard & Roberts. They will make a specialty of railway engineering, investigations, estimates and reports of existing or proposed lines, also savings in operation due to changes of line or gradients, railway location, yard and terminal plans, and valuations for state or federal use. The office of the new firm will be in the Transportation building, Chicago.

The Tousey Varnish Company has moved its offices from the McCormick building, 332 South Michigan avenue, Chicago, to the factory at 520 West Twenty-fifth street, where it has been for the past six months erecting an addition to its plant. This factory addition is of modern concrete construction, providing double the tankage capacity of the original plant, besides making room for added office space necessitated by the growth of the business. The former factory is being reconstructed—additional space being added, which will be devoted to the manufacture of high grade enamels and additional lines. The railway sales will, as heretofore, be under the management of Oscar C. Hayward.

Frank N. Grigg, whose appointment as sales agent of the Transportation Utilities Company, New York, for the southeastern and southern district of that company, has been announced in this column, was born in Richmond, Va., on August 9, 1876. He entered the employ of the Chesapeake & Ohio in 1892, and spent ten years in the motive power and stores department of that road. In January, 1903, he became eastern representative of the Adams & Westlake Company, Chicago, and for the past year up to the time of his new appointment he has been district manager of the Standard Heat & Ventilation Company, New York, with office at Washington. Mr. Grigg has his office at room 1201, Virginia Railway & Power building, Richmond. He is also sales agent for the Rostand Manufacturing Company, of Milford, Conn.

The General Electric Company

The General Electric Company in 1913 received the largest volume of orders, billed the greatest quantity of sales, received the largest income and with the exception of 1912, in which year it paid a 30 per cent. stock dividend of $23,354,300, declared the largest dividends in its history. The orders received reached a total of $111,819,142. Sales billed, the more important of the two, amounted to $106,477,439, exceeding the figure for 1912 by $17,295,253. The cost of sales was $96,207,833, which, subtracted from the amount of sales billed, leaves $10,269,605. Other income, including royalties, income from securities owned, etc., amounted to $3,796,184, so that the net profits for the year were $14,065,790, also the largest in the company's history. Interest on bonds, etc., on the other hand, amounted to $1,007,910, with the result that the net income for the year was $13,057,880. Dividends of 8 per cent. were paid to the amount of $8,149,205, leaving a surplus for the year of $4,908,675, which added to the surplus at January 1, 1913, brought the total surplus at December 31, 1913, to $16,939,820. The balance sheet shows that the company is in a remarkably strong position. The manufacturing plants, warehouses, etc., have a value of $30,485,557, there having been added to the first item during the year $11,373,118 and $6,502,060 written off. Patents, franchises and good will are as usual carried at the purely nominal value of $1, although there was a charge to income account of $662,925 expended for the purchase of patents, licenses, etc. The company also owns stocks and bonds of subsidiary companies to the value of $17,574,544, and there is due from these companies an amount of $6,817,563. The capital stock outstanding on December 31, 1913, was $101,381,200 of the total authorized of $105,000,000. The company has also issued debenture bonds to the amount of $12,151,500. The current liabilities, as usual, are small. They amount to but $13,652,841, and of this $8,000,000 consists of notes payable, due April 16, 1914. The current assets, including merchandise inventories, installation work in progress, stocks and bonds of public utility companies, notes and accounts receivable and cash, on the other hand, are to be figured at $89,247,422. Cash alone amounts to $14,844,210; inventories to $37,790,739, and notes and accounts receivable, to $26,210,459. With this preponderance of current assets over current liabilities, the General Electric Company is placed in a very firm financial position. It is interesting to note that in 1913 it received over 600,000 orders. On December 31, 1913, it had over 65,000 employees and its works contained 13,900,000 sq. ft. of floor space, an increase of 1,174,000 sq. ft. for the year.

TRADE PUBLICATIONS

Power Hammers.—Beaudry & Co., Inc., Boston, Mass., have issued a folder illustrating the Beaudry Peerless power hammers.

Nut Tapping Machines.—The National Machinery Company, Tiffin, Ohio, has issued a four page folder describing the National Semi-Automatic Nut Tapper.

Floor Hardener.—The Trus-Con Laboratories of Detroit, Mich., have issued a booklet containing a description of "Trus-Con" floor hardener, together with complete specifications for its use.

Signal Appliances.—The Union Switch & Signal Company has recently issued bulletin No. 69, describing in detail the "T D B" (Traffic Direction Block) system of absolute automatic block signaling for interurban electric railways.

Bearings.—Edwin S. Woods & Co. have just issued an attractive catalog illustrating the various designs of anti-friction side and center bearings manufactured by them, including their latest improved design, called the "Tip Roller" side bearing.

Railway Construction

ALL RED LINE.—See Labrador, Quebec & Southern.

ARKANSAS ROADS. (Electric).—The West Helena Consolidated Company has been incorporated with $650,000 capital to build electric railway lines. E. C. Horner, president, Helena; R. B. Macon, vice-president.

BUTTE, WISDOM & PACIFIC.—This company was incorporated last year in Montana, to build a line in Silverbow, Beaverhead and Deerlodge counties, Montana. Capital has been secured, it is said, and arrangements have been made with McArthur, Perks & Company, London, Eng., to build about 120 miles of railroad. J. G. Brown, Helena, Mont., may be addressed. (Septemper 19, p. 541.)

CANADIAN PACIFIC.—A contract has been given to George Webster, Calgary, Alta., it is said, for grading a 25-mile extension east of Stirling, of the branch from Lethbridge to Stirling.

This company, it is said, will lay about 120 miles of double track, this season, on the Lake Superior division west of Sudbury, Ont.

CENTRAL CANADA.—This company has filed route maps with the Alberta government of the proposed line to be built from a point on the Edmonton, Dunvegan & British Columbia at or near Round Lake, .Alta., through the North Hart river valley to Peace river crossing. About 60 bridges will be required, with spans varying from 75 to 125 ft. on one section of 18 miles. A large steel bridge will also be built at the Peace river crossing. Further surveys towards Dunvegan are now in progress. J. D. McArthur, Winnipeg, Man., is interested. (November 14, p. 938.)

CHARLESTON & INTERURBAN.—Plans are being made to build a line from Charleston, W. Va., to Montgomery, about 25 miles. S. M. Gallagher is superintendent, P. O. box 994, Charleston, and M. W. Venables & Son are the engineers.

GLENGARRY & STORMONT.—This company was organized some time ago, to build from St. Polycarpe Junction, Que., on the Canadian Pacific southwest via Williamstown, Ont., to Cornwall, 30 miles. It is said that contracts have recently been let for work on the line, as follows: To G. R. Phillips, four miles between Cornwall and Glen Donald, and the next section east of this will be built by the railroad company with its own forces; McDonald & Grant will build a section near Williamstown; A. F. Mulhern will build four miles east of Williamstown, and A. C. McArthur will build 12 miles from St. Polycarpe west. C. L. Hervey, chief engineer, 400 St. James street, Montreal, Que. (May 23, 1913, p. 1161.)

GLOBE & MIAMI TRACTION.—Organized to build an electric line from Globe, Ariz., west to Miami, about five miles. R. West, president, Miami.

ILLINOIS CENTRAL.—An officer writes that a grading contract has been given to M. J. Roach & Company, Memphis, Tenn., for work on an extension of the present line of the Yazoo & Mississippi Valley, between Yarborough, Miss., and Brazil southward to Swan Lake, 9.15 miles. The work on fills involves handling about 10,000 cu. yd. to the mile. The track laying and bridge work will be carried out by the railroad company's forces. There will be one 90-ft. steel bridge over Cassidy Bayou.

INTERNATIONAL SUBURBAN.—The Canadian parliament is being asked to incorporate this company to build railway lines from a point in Sandwich West township at or near Ojibway, Ont., through Ojibway, Sandwich, Windsor, Walkerville, Ford City, and the townships of Sandwich East and Maidstone, to Belle River, also to build easterly to Chatham, and from Sandwich West township, southwesterly to Amherstburg via the townships of Anderdon and Malden. Rodd, Wigle & McHugh, Windsor, Ont., are solicitors for applicants.

KANSAS ROADS (Electric).—We are told that the Century Engineering & Construction Company has under consideration the question of building a line from Columbus, Kan., south to Miami, Okla., about 22 miles. George D. Thayer, secretary, Joplin, Mo. (April 10, p. 856.)

LABRADOR, QUEBEC & SOUTHERN.—This is the new name of the All Red Line which asked for incorporation recently in Canada, to build from the Atlantic coast at a point west of Cape St. Charles to the Pacific at the head of Dean inlet, about 3,270 miles. The new company has a capital of $10,000,000, and has been authorized to build from Cape St. Charles on the Labrador coast west to the Peribonka river, 600 miles, and through the valley of the Peribonka river to a point on Lake St. John, 200 miles additional, thence to the city of Quebec, in all about 1,000 miles. J. K. Dowsley, Prescott, Ont., may be addressed. (November 20, p. 1003.)

NEW YORK SUBWAYS.—The New York Public Service Commission, First district, has awarded a contract for the construction of a section of the Seventh avenue subway, in the borough of Manhattan, between Battery place and a point just south of Vesey street, to the Rapid Transit Subway Construction Company, the lowest bidder, for $2,121,077. Bids were opened recently for building section No. 2 of routes Nos. 4 and 36, under Broadway between Twenty-sixth and Thirty-eighth streets, including a local station at Twenty-eighth street and an express station at Thirty-fourth street; the Thomas J. Buckley Engineering Company, New York, was the lowest bidder, at $2,450,000. All the bids, which were opened last March, for section No. 6-A of routes Nos. 4 and 38, were rejected. The lowest bidder was the Oscar Daniels Company at $304,316. The commission will readvertise for new bids to be received on May 13 for this section. Bids for the construction of the two new tunnels under the East river will be opened on May 22. One of the tunnels will run from Old Slip, Manhattan, to Clark street, Brooklyn. The other will run from Whitehall street, Manhattan, to Montague street, Brooklyn.

NORFOLK & WESTERN.—An officer writes that the Tug River & Kentucky will build a line from a point near Matewan, W. Va., opposite the mouth of Blackberry creek, thence across Tug river and continuing south along Blackberry creek in Pike county, Ky., to the mouth of Peters Fork, about 1.5 miles. It has not yet been decided when the grading contracts will be let. This work involves handling about 30,000 cu. yd. to the mile. The maximum grade will be 0.7 per cent. and the maximum curvature 12 deg. There will be one steel bridge 540 ft. long and another 180 ft. long.

NORTHERN PACIFIC.—According to press reports, track laying has been resumed on the extension west of Stanton, N. D., between Golden Valley and Dunn.

OGDEN RAPID TRANSIT.—Surveys are now being made, it is said, for an extension from Brigham, Utah, northwest to Garland, about 20 miles.

OHIO & PENNSYLVANIA.—This company, with $500,000 capital, has been authorized to build the Panther Run Branch, a short industrial line to connect the Youngstown Sheet & Tube Company with the Ohio Iron & Steel Company at Lowellsville, Ohio, three miles, at a cost of $200,000. The plans call for an extension beyond Lowellsville into the Hillsville limestone quarry district. It is expected that the work will be completed by January, 1915. R. Bentley, president; S. D. L. Jackson, vice-president; D. Davis, secretary and treasurer, and R. Garlick, J. C. Wick, T. F. Woodman and P. Wick, directors.

OIL BELT TRACTION.—Incorporated in Arizona with $5,000,000 capital and with headquarters at Oklahoma City, Okla. Application was recently made for a franchise at Fort Smith, Ark. The plans call for building from Fort Smith west to Shawnee, Okla., about 150 miles.

OREGON SHORT LINE.—An officer writes that all the grading in connection with the double track work on the Idaho division, was completed during 1913, but on account of the scarcity of labor, rail was not laid on the completed grade. This work is now in progress. (December 12, p. 1148.)

PENNSYLVANIA RAILROAD.—An officer writes regarding the report that plans are being made to build a connecting line from Grampian, Pa., to Dubois, about 12 miles, that surveys have been made, but the work will not be carried out in the near future.

PORTSMOUTH STREET RAILROAD & LIGHT COMPANY.—Bids are

wanted until May 15, for building 22 miles of electric railroad. The company now operates a line from Portsmouth, Ohio, east to Sciotoville. L. D. York, president, W. A. Martin, chief engineer, Portsmouth.

Rolla, Ozark & Southern.—Incorporated in Missouri with $200,000, to build from Rollo, Mo., south to Anutt, in Dent county, 18 miles. The incorporators include J. A. Frank, Anutt, and E. W. Walker, Rolla.

St. Louis, Oklahoma & Western.—According to press reports, plans are being made to build a line from Miami, Okla., west via Bartlesville, Pawhuska, Ponca City and Enid to Alva. Residents of the towns along the proposed route are back of the project.

San Antonio, San Jose & Medina Interurban.—Incorporated in Texas with $100,000 capital to build from San Jose, Tex., southwest to Kirk on the Artesian Belt, about 20 miles. A contract has been given to the Texas Construction Company, it is said, for the engineering work. C. A. Newton is secretary of the railroad company.

Spokane, Wallace & Interstate.—This company has made a mortgage, the proceeds of which are to be used to complete a line from Coeur d'Alene, Idaho, east to Wallace. The line is to be built around Fourth of July canyon to the Coeur d'Alene river, thence parallel to the tracks of the Oregon-Washington Railroad & Navigation Company into Wallace. A. J. Devlin is acting vice-president and D. R. Treat, assistant secretary.

Temiskaming & Northern Ontario.—Plans are being made to build an extension, it is said, from Cochrane, Ont., northwest to Port Nelson on Hudson Bay.

Texas Roads (Electric).—Plans are being made to build an interurban line from McKinney, Tex., northeast via Blue Ridge to Bonham, about 40 miles. J. L. Lovejoy, S. D. Heard, L. A. Scott and J. P. Crouch, all of McKinney, Tex., are said to be interested.

Tug River & Kentucky.—See Norfolk & Western.

Yazoo & Mississippi Valley.—See Illinois Central.

RAILWAY STRUCTURES

Freeport, Tex.—Bids are wanted until May 11, by J. W. Munson, county judge at Angleton, Tex., for the construction of the steel and concrete bridge across Brazos river between Velasco and Freeport. This is to be a combined railroad and county bridge, and will be built jointly by the Houston & Brazos Valley and Brazoria county. (April 3, p. 812.)

Harrisburg, Pa.—A contract has been given to T. Larry Eyre, Philadelphia, Pa., for constructing subways under the tracks of the Cumberland Valley. The improvements being carried out include the removal of a number of grade crossings at Harrisburg. (September 12, p. 480.)

Phoenixville, Pa.—The Pennsylvania Railroad has given a contract to L. H. Focht & Son, Reading, Pa., to build a new double track, ten arch concrete bridge over the Schuylkill river at Phoenixville. The new structure will cost about $300,000, and will replace the old single track steel bridge.

Matewan, W. Va.—An officer of the Norfolk & Western writes that bids will be received by J. E. Crawford, chief engineer, Roanoke, Va., for building a bridge over Tug river on the Tug River & Kentucky, at Matewan. The new bridge is to have a concrete masonry substructure with steel superstructure. It will have five deck plate spans, and one truss span, consisting of two 70-ft. spans, three 80-ft. spans and one 160-ft. span. The cost of the bridge will be $160,000.

New York.—A contract has been given to the MacArthur Concrete Pile & Foundation Company, New York, by the New York Connecting Railroad, for the concrete-steel pile foundation of a retaining wall to be built between One Hundred and Thirty-eighth and One Hundred and Forty-first streets, in the borough of the Bronx, New York. Gustav Lindenthal, chief engineer, New York.

Salt Lake City, Utah.—The Denver & Rio Grande has ordered the construction of new freight terminals at Salt Lake City to cost about $100,000.

Railway Financial News

New York Central & Hudson River.—The Interstate Commerce Commission, in accordance with the resolution recently passed by the Senate calling upon it to make an investigation of the proposed consolidation of the New York Central & Hudson River and the Lake Shore & Michigan Southern, has made a report in which it says in part: The New York Central states its main object in consolidating is not so much to effect economy in operation of the two companies as to afford a broader basis for their future financing. Nevertheless it estimates that perhaps $325,000 a year can be saved by unification and simplification of accounting, etc., . . . and that $200,000 annually can be saved under the federal income tax law because of present triplicate taxation. . . . It seems probable to the commission that by the consolidation a substantial saving can be effected, possibly a sum equal to $452,892, the increase in interest charges which will be made by the consolidation plan. . . . We think that as a practical matter the exchange of the 3½ per cent. Lake Shore collateral bonds for 4 per cent. consolidated mortgage bonds is under the circumstances disclosed, a necessary step in the carrying out of the proposed consolidation plan as outlined by the New York Central.

Directors have given out some details of the proposed consolidation. Under this plan the name of the consolidated companies will be the New York Central Railroad Company. It will have a capital stock of $300,000,000, of which $249,590,500 is to be issued to the stockholders of the consolidated companies. The New York Central & Hudson River stockholders are to receive par for par new stock for their old. The minority stockholders of the Lake Shore & Michigan Southern are offered $500 in new stock for $100 par value of old stock. Lake Shore stock held by the New York Central & Hudson River now and by its subsidiary companies is to be canceled. A meeting of the stockholders of both companies and of the other subsidiary companies which are to be consolidated has been called for July 20, at which time the full plan will be submitted.

New York, New Haven & Hartford.—The arrangements which, as previously announced, have been made for the sale of certain securities of the company, provide for the sale by the New York, New Haven & Hartford of $20,000,000 5 per cent. one-year notes; by the Harlem River & Port Chester of $20,000,000 5 per cent. one-year notes, endorsed by the New York, New Haven & Hartford, and $20,000,000 three-year 6 per cent. notes by the New England Navigation Company. The first two issues are a direct obligation of the New York, New Haven & Hartford and the third is secured by collateral.

A syndicate has been formed consisting of J. P. Morgan & Co., National City Bank, First National Bank, all of New York, and Kidder, Peabody & Company, and Lee, Higginson & Company, both of Boston, to underwrite the sale of these notes. This syndicate bought the total $60,000,000 issue at 98 and will offer to the public, it is understood, the New Haven and the Harlem River & Port Chester notes at 99, and the New England Navigation notes at 99½.

St. Louis & San Francisco.—George W. Simmons, vice-president of the Simmons Hardware Company; Murray Carleton, president of the Carleton Dry Goods Company, and A. S. Grieg, assistant to the receivers, have been elected directors, succeeding Thomas H. West, of the St. Louis Union Trust Company, and Albert T. Perkins, of the same company, resigned, and William K. Bixby, resigned some time ago.

Judge Sanborn, in the United States district court, has refused permission to the receivers to issue $3,000,000 receivers' certificates to pay interest on the general lien bonds and other interest which will be due May 1.

Wabash.—Judge Hough, of the United States district court, has authorized the receiver to pay on May 1 the semi-annual interest, amounting to $847,500, on the first mortgage bonds of the company and to issue $691,000 6 per cent. receiver's certificates.